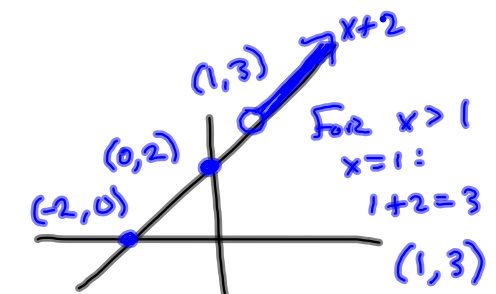
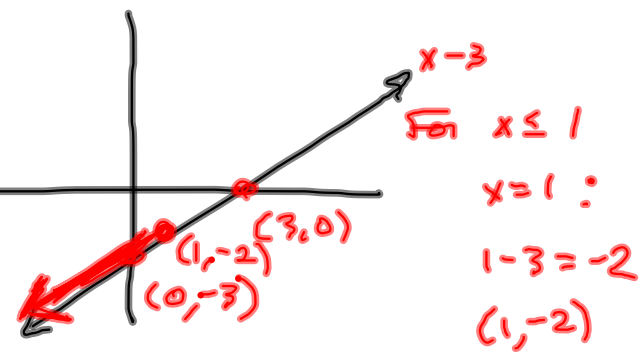


$$f(x) = \begin{cases} x+2 & \text{for } x > 1 \\ x-3 & \text{.. } x \leq 1 \end{cases}$$



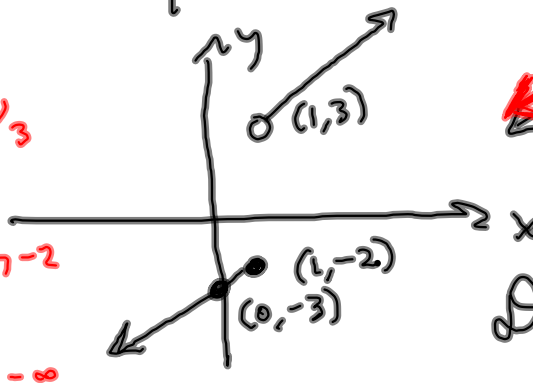
$$g(x) = x$$

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



∞
 \downarrow
 3

-2
 \downarrow
 $-\infty$



$$D = \{x \mid x \text{ is real}\}$$

$$= \mathbb{R} = (-\infty, \infty)$$

$$R = (-\infty, -2] \cup (3, \infty)$$

$$= \{y \mid y = f(x) \text{ for legit } x\}$$

$x \in D$

$$x^2 + y^2 = 36$$

Solve for y:

$$y^2 = 36 - x^2$$

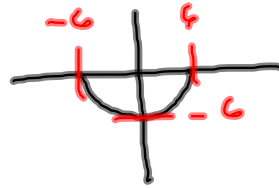
$$f(x) = -\sqrt{36 - x^2}$$

Bottom $\frac{1}{2}$ of the circle!

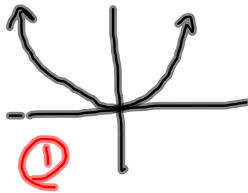
$$\sqrt{y^2} = \sqrt{36 - x^2}$$

$$|y| = \sqrt{36 - x^2}$$

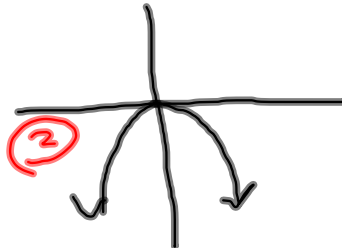
$$y = \pm \sqrt{36 - x^2}$$



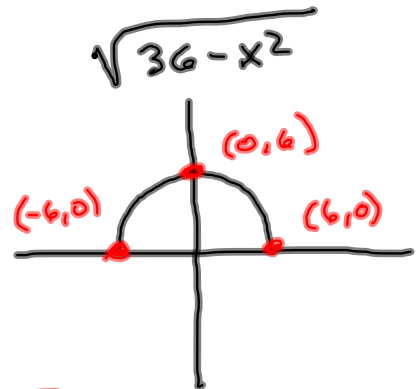
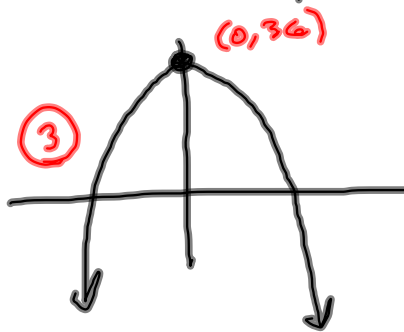
$$f(x) = x^2$$



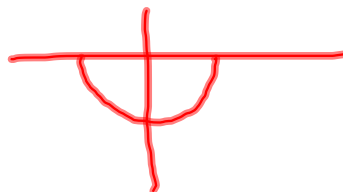
$$-f(x) = -x^2$$

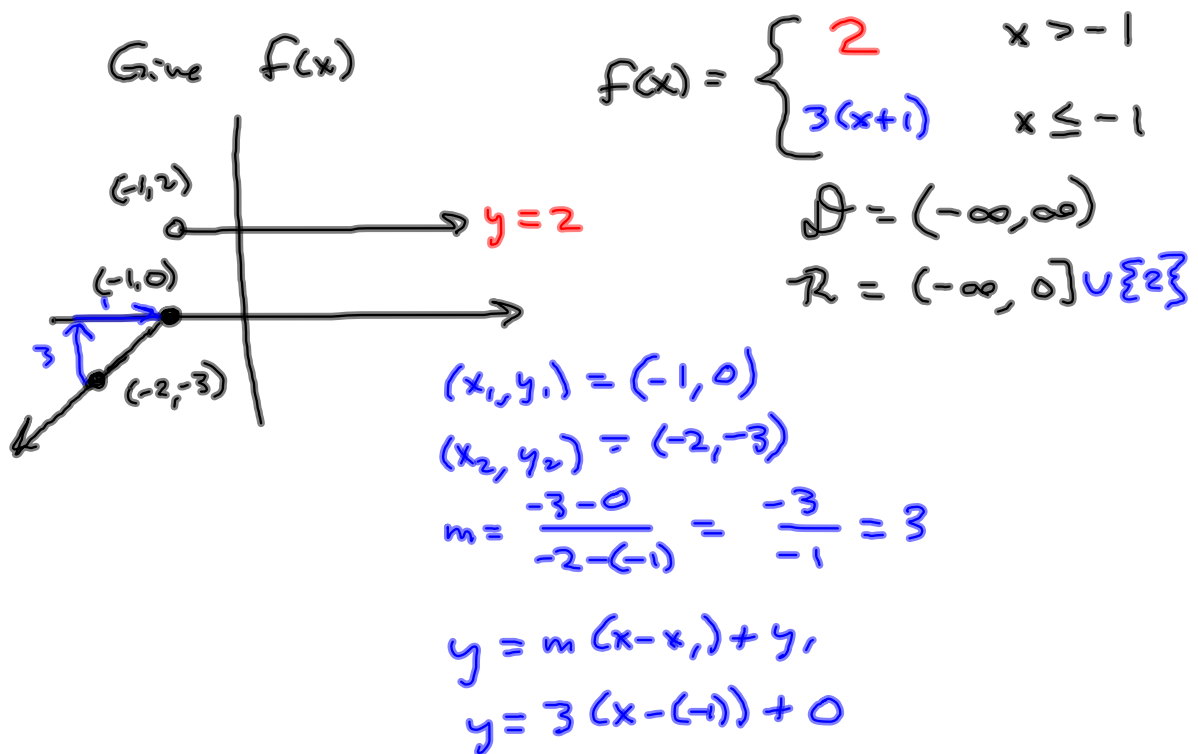


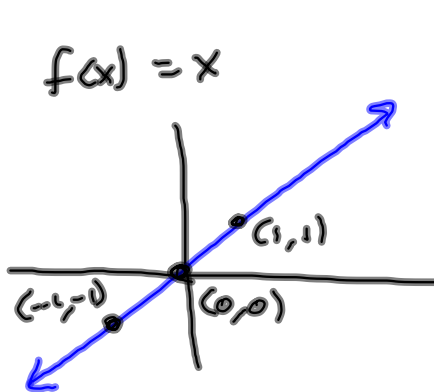
$$\begin{aligned} 36 - x^2 \\ = -x^2 + 36 \\ = -f(x) + 36 \end{aligned}$$



So $-\sqrt{36-x^2}$ is





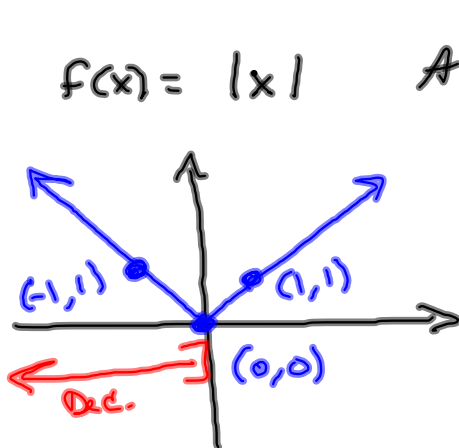


Identity Function

$$D = (-\infty, \infty)$$

$$R = (-\infty, \infty)$$

Increasing on $(-\infty, \infty)$



Absolute Value Function

$$D = (-\infty, \infty)$$

$$R = [0, \infty)$$

Increasing: $[0, \infty)$

Decreasing: $(-\infty, 0]$

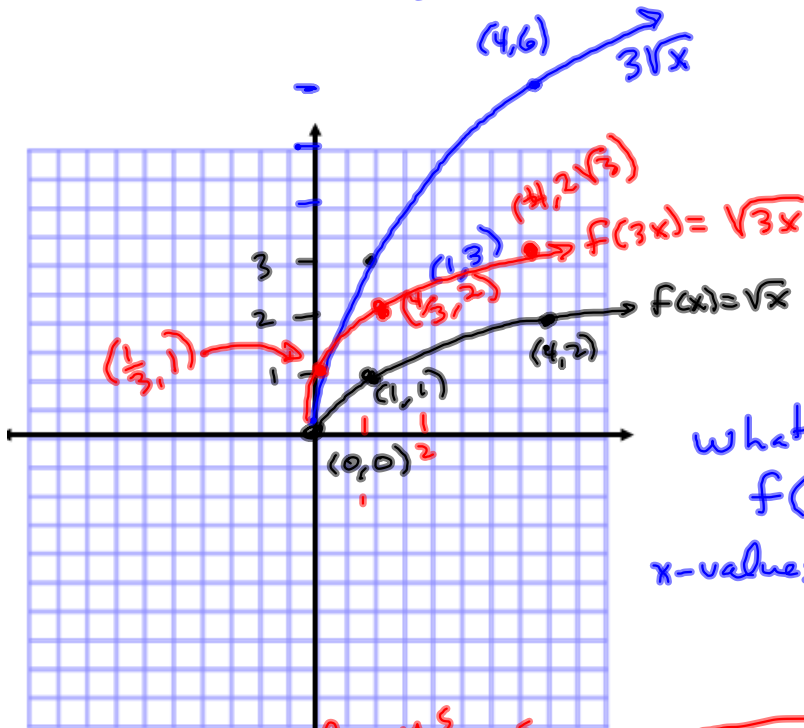
x-values for which the function displays the property.

Goal:

$$-3|x| + 7$$

$3f(x)$ - versus - $f(3x)$

$f(x) = \sqrt{x}$. $g(x) = 3\sqrt{x} = 3f(x)$ y-values times 3.



what about $f(3x)$
x-values times $\frac{1}{3}$

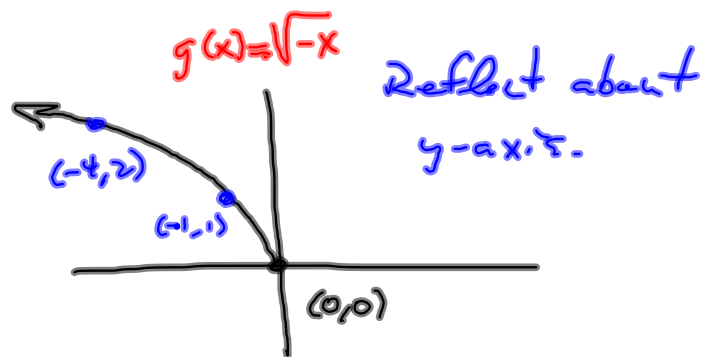
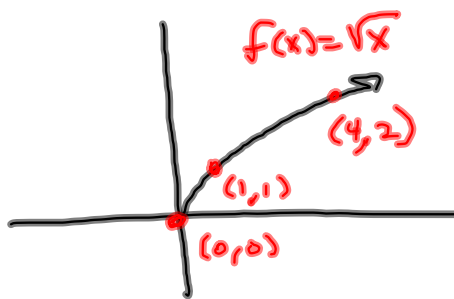
You can't always get $f(kx)$ in terms of $wf(x)$.

$$\sqrt{3x} = \sqrt{3} \sqrt{x}$$

$\frac{1}{3}$ times x's = $\sqrt{3}$ times y

↳ weird.

$$g(x) = \sqrt{-x} = \underline{f(-x)} \quad \text{all } x\text{'s become } -x\text{'s}$$



$$f(x-2) \quad \text{Right } 2$$

$$f(x-2) - 2 \quad \text{Right } 2, \text{ Down } 2$$

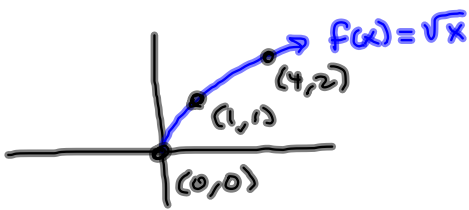
$$-3f(x-2) - 2$$

$$-\left(3f(x-2) - 2\right) = -3f(x-2) + 2$$

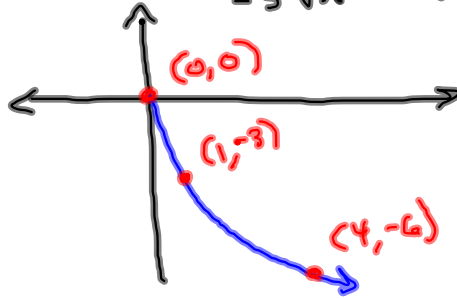
Do vertical Reflection 1st

$$\boxed{-3f(x)} \quad \text{Flip \& stretch in one step}$$

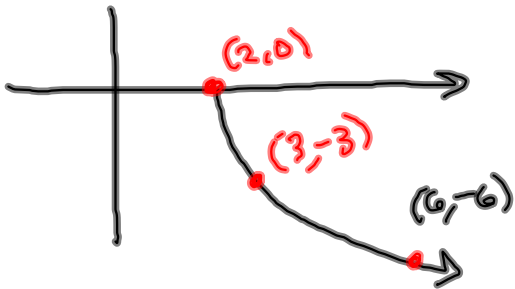
$$-3\sqrt{x-2} - 2$$



$$-3\sqrt{x} = -3f(x)$$



$$-3f(x-2) = -3\sqrt{x-2}$$



$$-3f(x-2) - 2 = g(x) = -3\sqrt{x-2} - 2$$

