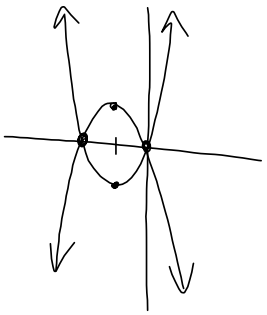
1.2 Reflections & Stretches

Reflections

Graph $y = x^2 + 2x$. Then reflect it over x-axis.



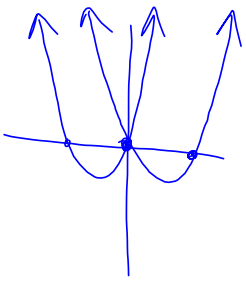
$-y = x^2 + 2x$ $\quad y = -f(x)$

$y = -(x^2 + 2x)$

$y = -x^2 - 2x$

$(x, y) \to (x, -y)$

Graph $y = x^2 + 2x$. Then reflect it over y-axis.



$y = (-x)^2 + 2(-x)$

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

$y = x^2 - 2x$

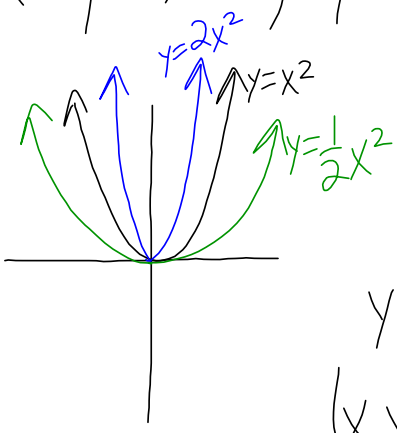
$(x, y) \to (-x, y)$

Summary: $y = -f(x)$ reflection over X-axis

$y = f(-x)$ reflection over Y-axis

Stretches

Graph $y=x^2$, $y=2x^2$, $y=\frac{1}{2}x^2$



$y=x^2$ → $y=2x^2$: VS by 2 ↑ $y=\frac{1}{2}x^2$: VS by ½ ↑

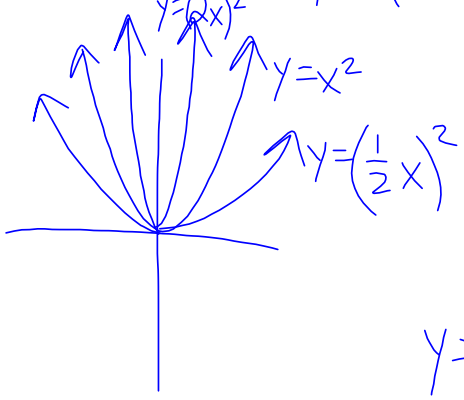
$y=2f(x)$ $y=\frac{1}{2}f(x)$

$(x,y)\to(x,2y)$ $(x,y)\to(x,\frac{1}{2}y)$

Summary: $y=af(x)$ VS by a

$\frac{1}{a}y=f(x)$

Graph $y=x^2$, $y=(2x)^2$, $y=(\frac{1}{2}x)^2$



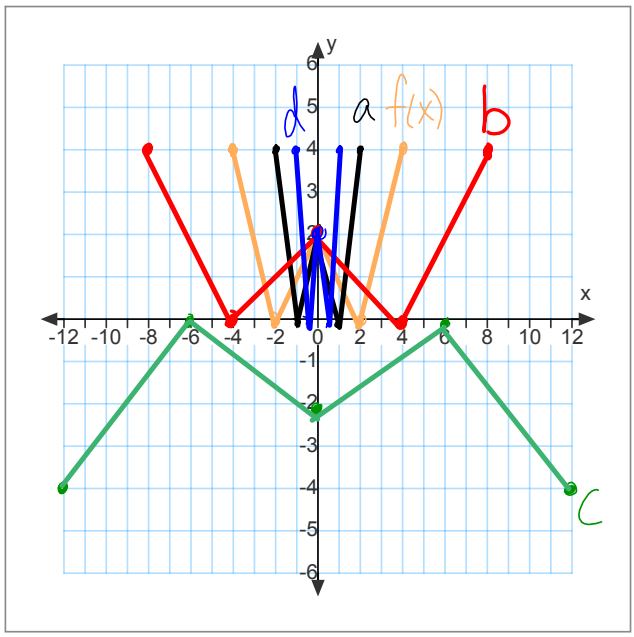
$y=x^2$ → $y=(2x)^2$: HS by $\frac{1}{2}$ ↑ $y=(\frac{1}{2}x)^2$: HS by 2 ↑

$y=f(2x)$ $y=f(\frac{1}{2}x)$

$(x,y)\to(\frac{1}{2}x,y)$ $(x,y)\to(2x,y)$

Summary: $y=f(bx)$ HS by $\frac{1}{b}$

Ex 3)



a) $g(x) = f(2x)$

b) $g(x) = f\left(\frac{1}{2}x\right)$

c) $g(x) = -f\left(\frac{1}{3}x\right)$

d) $g(x) = f(-4x)$

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