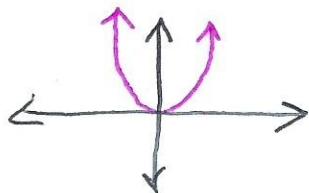


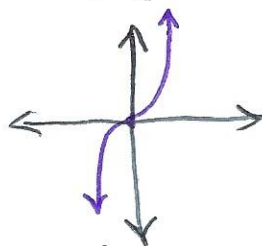
Parent functions:

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[ex] Quadratic $F(x) = x^2$



[ex] Cubic $F(x) = x^3$



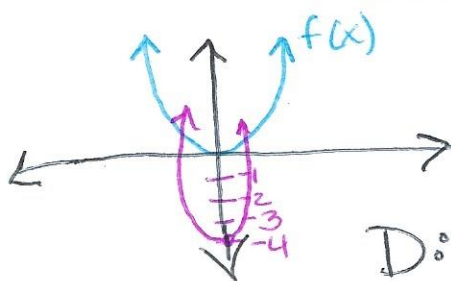
(Graph using transformations)

• Transformations: can slide, stretch, shrink

• Vertical transformations: happening outside the parent function

[ex] $g(x) = x^2 - 4$

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



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

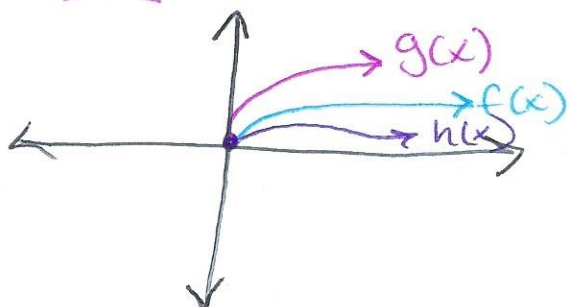
$R: [-4, \infty)$

adding or subtracting on the outside (shifts up/down)

• Vertical stretch/shrink: - multiply P.f. by a # > 1 (pulls the graph towards the y-axis)

[Ex] $g(x) = 3\sqrt{x}$ P.f. $f(x) = \sqrt{x}$

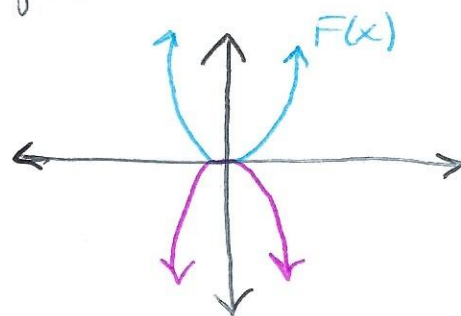
$h(x) = \frac{1}{2}\sqrt{x}$



- multiply P.f. by a # between 0 and 1. (pulls the graph closer to the x-axis)

- Vertical Reflection - multiply the P.f by a negative.

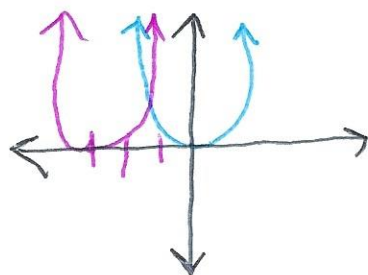
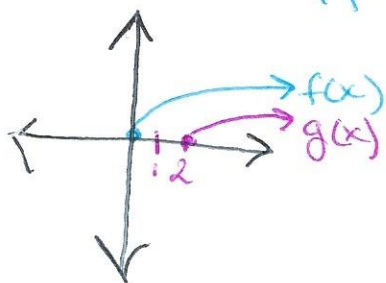
[ex] $F(x) = x^2$ $g(x) = -x^2$



* Reflection has to happen first. *

◦ Horizontal Transformations: (Do the opposite)
left → add right → sub.

• add/sub [ex] $g(x) = \sqrt{x-2}$ $h(x) = (x+3)^2$
P.f. $f(x) = \sqrt{x}$ P.f. $f(x) = x^2$



• Horizontal stretch/shrink (x-axis)

- (stretch) * multiply x by a #, where $0 < \# < 1$ (closer to the x-axis)
- (shrink) * multiply x by a #, where $\# > 1$ (closer to the y-axis)

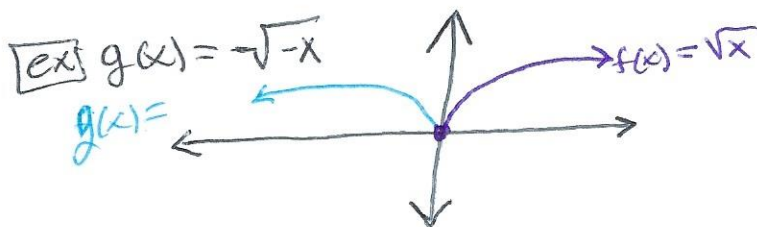
[ex] $g = \sqrt{2x}$

[ex] $g = \sqrt{\frac{1}{2}x}$

• Horizontal Reflection

* flip over the y-axis

(Reflection needs to happen last)



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