Trig 3.4 *Alg 1 Ch. 4

$f(x)$

Determine inverses of relations and functions*
Graphs functions and their inverses

$(2,5)\ (3,1)\ (0,-6)$

domain x

$f^{-1}(x)\ (5,2)\ (1,3)\ (-6,0)$

range y

line of symmetry (y=x)

$f(x)\ y = 2x - 6$

inverse function (x,y)....(y,x)

$x = 2y - 6$
$+6 \quad +6$

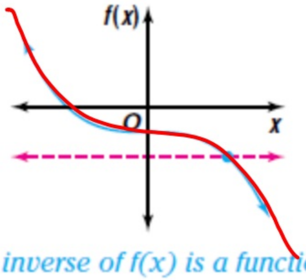
$f^{-1}(x)\ y = \frac{1}{2}x + 3$

vertical line test (VLT)

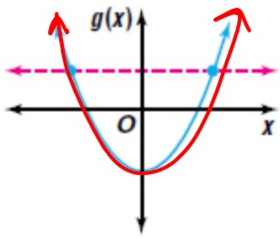
horizontal line test (HLT)

$\frac{x+6}{2} = \frac{2y}{2}$

Inverse Relations	Two relations are inverse relations if and only if one relation contains the element (*b*, *a*) whenever the other relation contains the element (*a*, *b*).



The inverse of f(x) is a function.



The inverse of g(x) is not a function.

$g(x)$ function

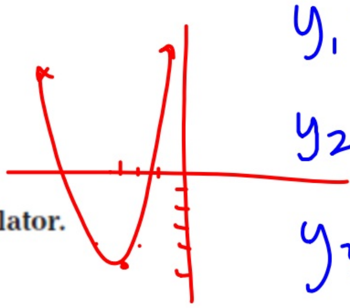
$g^{-1}(x)$ not "

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

a. Is the inverse of $f(x)$ a function? no

b. Find $f^{-1}(x)$.

c. Graph $f(x)$ and $f^{-1}(x)$ using a graphing calculator.



$y_1 = (x+3)^2 - 5$

$y_2 = \sqrt{x+5} - 3$

$y_3 = -\sqrt{x+5} - 3$

$y_4 = x$

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

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

$+5 \qquad +5$

$\sqrt{x+5} = \sqrt{(y+3)^2}$

$\pm\sqrt{x+5} = y + 3$

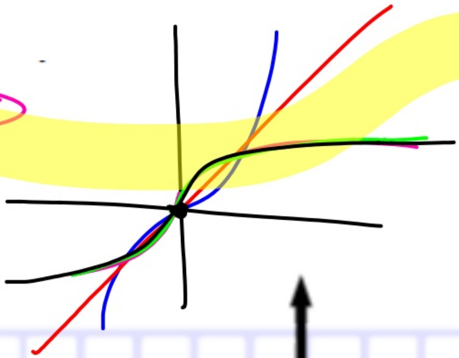
$-3 \qquad -3$

$y = -3 \pm \sqrt{x+5}$

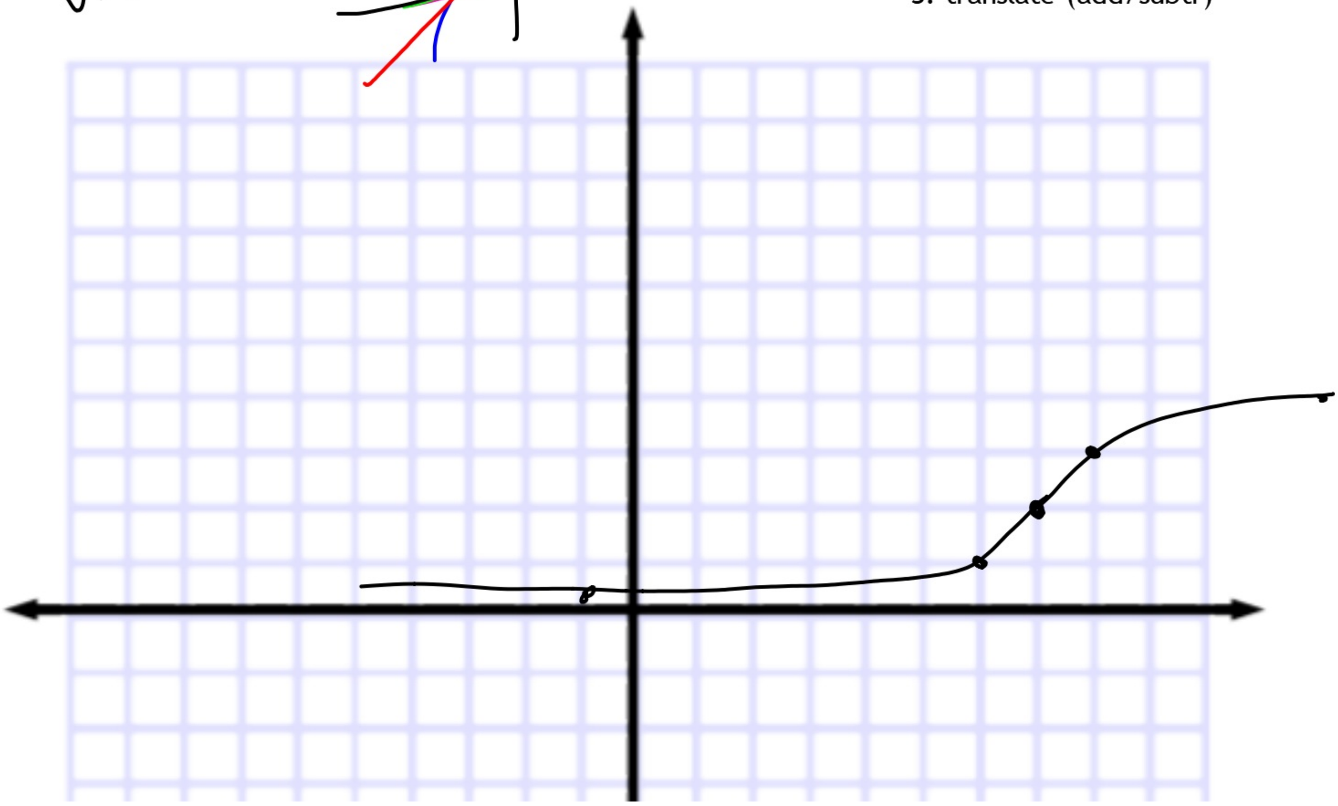
$f^{-1}(x) = \pm\sqrt{x+5} - 3$

3 Graph $y = 2 + \sqrt[3]{x - 7}$

$\sqrt[3]{x}$



Order of operations:
1. parent (cubic)
2. reflect (y=x)
3. translate (add/subtr)



$y = x^2 + 2x + 4$

$-4 \qquad\qquad -4$

$y - 4 = x^2 + 2x + 1$

$+1$

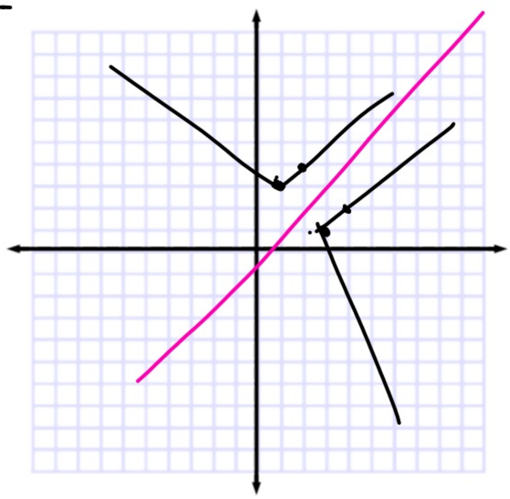
$y - 3 = (x+1)^2$

$+3 \qquad\qquad + 3$

$y = (x+1)^2 + 3$

$y = |x-1| + 3$

1	3

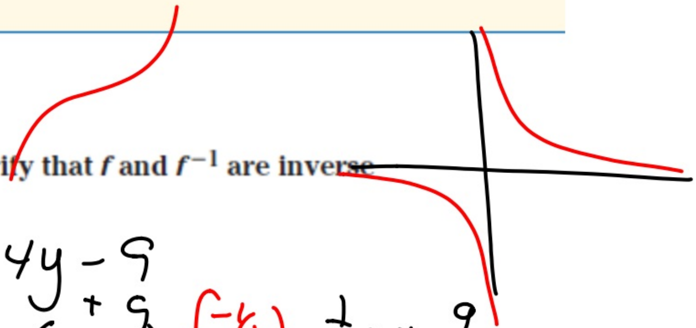


Composition functions (from alg2)

$5 off -20%

Inverse Functions	Two functions, f and f^{-1}, are inverse functions if and only if $[f \circ f^{-1}](x) = [f^{-1} \circ f](x) = x$.

$.8(x - 5)$



5 **Given $f(x) = 4x - 9$, find $f^{-1}(x)$, and verify that f and f^{-1} are inverse functions.**

$f(x) = 4x - 9$

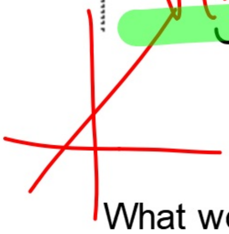
$y = 4x - 9$

$x = 4y - 9$

$+9 \quad +9$

$\frac{4y}{4} = \frac{x+9}{4}$

$f^{-1}(x) = y = \frac{1}{4}x + \frac{9}{4}$



What would we expect to see?

$x \rightarrow$ [f: $(4)(x) - 9$] $\xrightarrow{4x-9}$ [f^{-1}: $\frac{1}{4}(4x-9) + \frac{9}{4}$] $\quad x - \frac{9}{4} + \frac{9}{4}$

x

$x \rightarrow$ [f^{-1}] $\rightarrow$ [f] $\rightarrow x$

Verify by using composition:

15-47

39 odd