Ch 1.4 Inverse of a Relation DAY 2

$y = x^2 - 6x + 13$ vertex (3,4)

$y - 4 = (x-3)^2$

Example: Given $f(x) = x^2 - 6x + 13$

A) Find its inverse

$y = x^2 - 6x + 13$

$x = y^2 - 6y + 13$

$x - 13 = y^2 - 6y$

Complete the square

$\left(\frac{-6}{2}\right)^2 = 9$

$x - 13 + 9 = y^2 - 6y + 9$

$x - 4 = (y-3)^2$

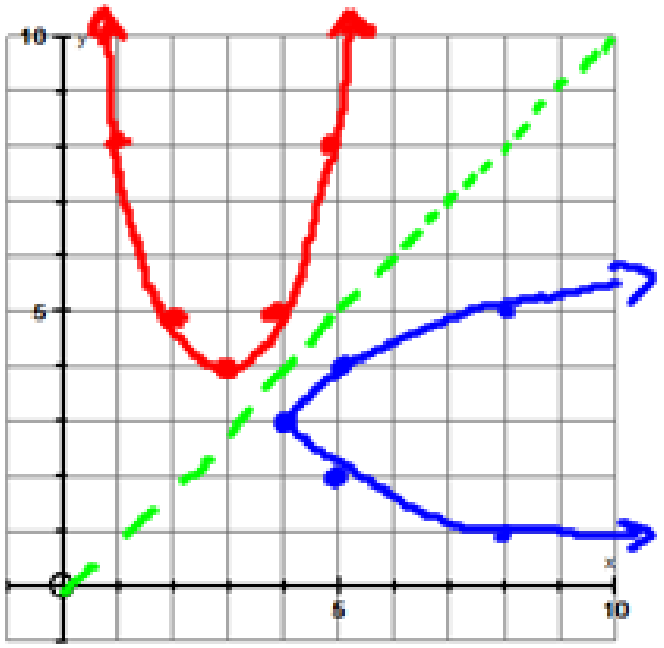
$(y-3)^2 = x - 4$

$\sqrt{(y-3)^2} = \sqrt{x-4}$

$y - 3 = \pm\sqrt{x-4}$

$y = 3 \pm \sqrt{x-4}$

B) Graph $f(x)$ and its inverse



Example: Determine graphically if the functions are inverses of each other.

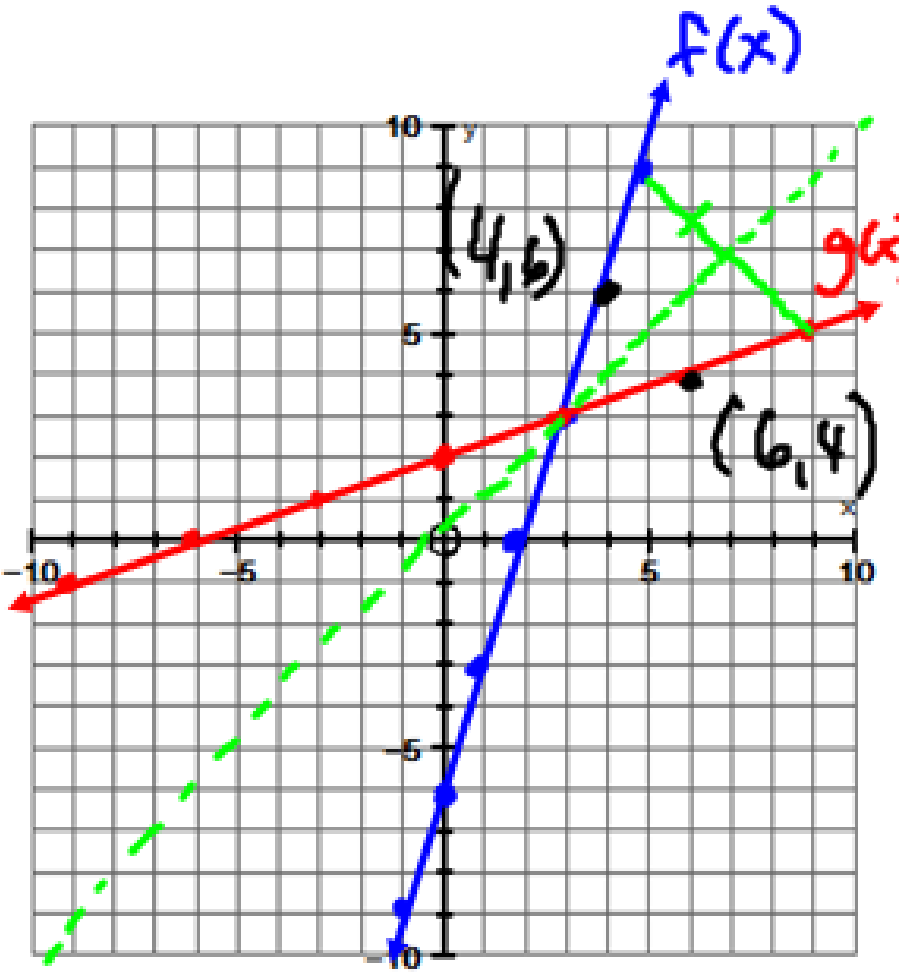
slope $y = mx + b$ ← y-int

A) $f(x) = 3x - 6$ and $g(x) = \frac{1}{3}x + 2$

$m = \frac{\Delta y}{\Delta x} = \frac{\text{rise}}{\text{run}}$

- look for symmetry with $y = x$ axis
- compare the coordinates

→ $g(x)$ is an inverse of $f(x)$



Algebraically determine if these are inverses of each other.

A) $f(x) = \frac{1}{2}x - 1$ and $g(x) = 4x + 6$

find $f^{-1}(x)$

$y = \frac{1}{2}x - 1$

$x = \frac{1}{2}y - 1$

$x + 1 = \frac{1}{2}y$

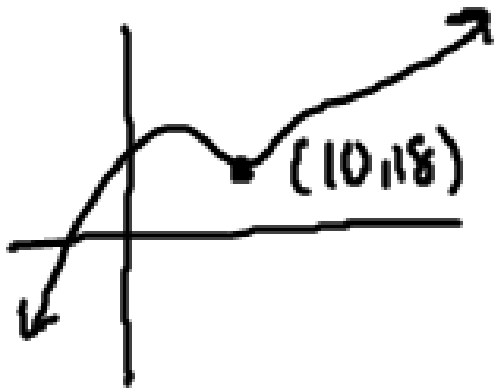
$2(x+1) = y$

$y = 2x + 2$

once we find $f^{-1}(x)$ we compare it to $g(x)$, if they are the same, it is an inverse. If not... then it is not an inverse

$g(x)$ is NOT the inverse of $f(x)$

Example: IF the point (10, 18) is on the graph of the function $y = f(x)$, what point must be on the graph of the following:




→ find the inverse coordinate pt

→ (18,10)

→ find transformations

→ find a mapping Rule

A) $y = f^{-1}(x-3)$

HT +3

$(x,y) \to (x+3,y)$

$(18,10) \to (18+3,10)$

$\to (21,10)$

B) $y = 3f^{-1}(x) - 1$

VS3 VT-1

$(x,y) \to (x,3y-1)$

$(18,10) \to (18,29)$

C) $y = f^{-1}(-2x)$

HS $\frac{1}{2}$ Ry

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

$(18,10) \to (-9, 10)$

HW: pg 53 #10,13,21 & ch 1 review pg 56