Inverse (3.1)

$F(x) = 3x \qquad F^{-1}(x) = \frac{x}{3}$

- Finding the inverse of a function, given the equation. (using the switch and solve method)

$F(x) = 3x-2$, find $F^{-1}(x)$

$y = 3x-2$

$x = 3y-2 \rightarrow x+2 = 3y \rightarrow y = \frac{x}{3} + \frac{2}{3}$

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

$g(x) = \{(2,1),(5,4),(1,0),(7,6)\}$

$g(1) = 0$ (x, y) $\quad g^{-1}(4) = 5$ (y, x)

$g^{-1}(g(5)) \rightarrow g^{-1}(4) \rightarrow \boxed{5}$

Determining if two functions are inverse, if I can compose them in one direction and get x. If compose them the other way and get X. Then the two functions are inverses of each other.

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

$g(x) = \frac{x+2}{3}$

$f(g(x)) = 3\left(\frac{x+2}{3}\right) - 2 = x+2-2 = \boxed{x}$

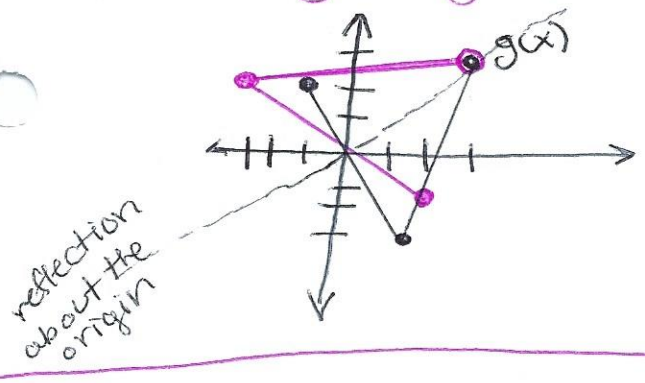
$g(f(x)) = \frac{(3x-2)+2}{3} = \frac{3x-2+2}{3} = \frac{3x}{3} = \boxed{x}$

They are inverses!

Ex2 $g(x) = \frac{x-7}{5} \qquad h(x) = 5x-7$

$g(h(x)) = \frac{(5x-7)-7}{5} = \frac{5x-14}{5} = x - \frac{14}{5}$ could not simplify to just "x" so not inverse

Sketching the graph of an inverse



Sketch $g^{-1}(x)$

$g(x) \rightarrow g^{-1}(x)$

$(3,3) \rightarrow (3,3)$

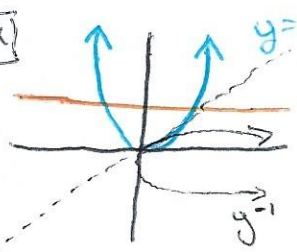
$(2,-3) \rightarrow (-3,2)$

$(-1,2) \rightarrow (2,-1)$

Function: every x-value has exactly 1 y value. (vertical line test)

One-to-one Function: the inverse is also a function. (Horizontal line test)

ex



> Therefore the inverse of x^2 is not a function.

$F(x) = \frac{4x-1}{x+2}$ it is a one-to-one therefor the inverse is a function.

find $F^{-1}(x)$ by switch method.

$$x = \frac{4y-1}{y+2} \rightarrow x(y+2) = 4y-1 \rightarrow xy+2x = 4y-1 \rightarrow xy-4y = -2x-1$$

$$y(x-4) = -2x-1 \rightarrow y = \frac{-2x-1}{x-4} \rightarrow \boxed{F^{-1}(x) = \frac{-2x-1}{x-4}}$$

Find the domain + Range of $F(x) = \frac{4x-1}{x+2}$

Domain $(-\infty,-2) \cup (-2,\infty)$

Range $(-\infty,4) \cup (4,\infty)$

Find the domain of $F^{-1}(x)$ + Range

Domain: $(-\infty,4) \cup (4,\infty)$

Range: $(-\infty,-2) \cup (-2,\infty)$