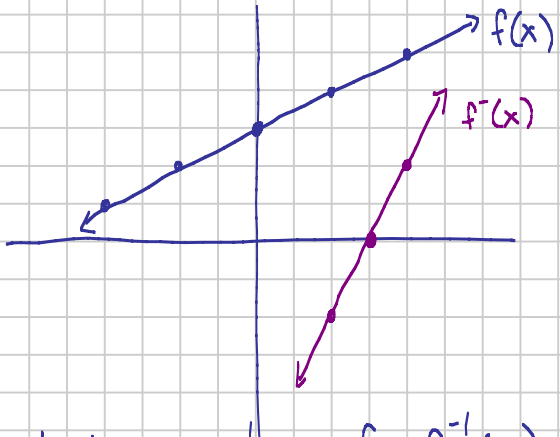
1.4 Part 2 Inverse of a Relation.

Note Title 2/7/2013

#1 Graph $f(x) = \frac{1}{2}x + 3$ and its inverse



line $y = mx + b$

b = y-intercept
m = slope

Find the equation of $f^{-1}(x)$

2 points (3,0) (4,2)

$m = \frac{2-0}{4-3}$

$m = 2$

point slope formula

$y - y_1 = m(x - x_1)$

$y - 0 = 2(x-3)$

$y = 2x - 6$ $\quad f^{-1}(x) = 2x - 6$

We can find the equation of the inverse by switching the x and y's.

Find the inverse of $f(x) = \frac{1}{2}x + 3$

$y = \frac{1}{2}x + 3$

inverse

$x = \frac{1}{2}y + 3$

$x - 3 = \frac{1}{2}y$

$2x - 6 = y$ $\quad f^{-1}(x) = 2x - 6$

① switch x and y

② Rewrite as y=

2 Find the equation of the inverse $f(x) = 4x - 5$

$y = 4x - 5$

inverse

$x = 4y - 5$

$x + 5 = 4y$

$\frac{1}{4}x + \frac{5}{4} = y$

$f^{-1}(x) = \frac{1}{4}x + \frac{5}{4}$

3 $f(x) = x^2 - 3$ find $x = f(y)$

$y = x^2 - 3$

Find inverse

inverse

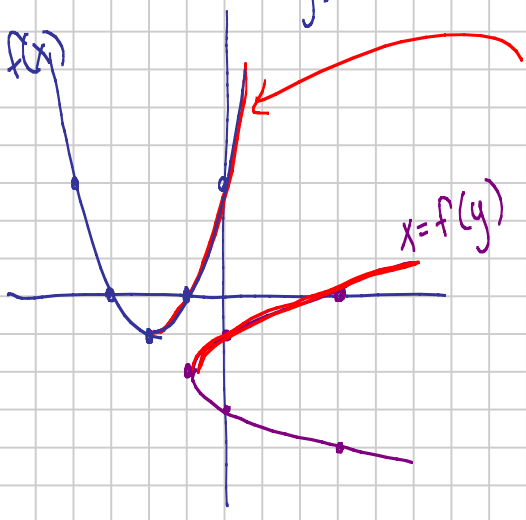
$x = y^2 - 3$

$x + 3 = y^2$

$\pm\sqrt{x+3} = y$ ← Not a function.

4 $f(x) = (x+2)^2 - 1$

find $x = f(y)$ and then restrict the domain of $f(x)$ so that $x = f(y)$ is a function.



$x \geq -2$

Use only the right of the parabola then produce only the top of the inverse

Equation of inverse

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

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

$\pm\sqrt{x+1} = y+2$

or

$f(x)$ was restricted to $x \le -2$

$\sqrt{x+1} - 2 = y$

$f^{-1}(x) = -\sqrt{x+1} - 2$

$f^{-1}(x) = \sqrt{x+1} - 2$

#5 $f(x) = \frac{3}{x+2}$ $x \neq -2$ find $x = f(y)$

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

inverse

$(y+2)(x) = \left(\frac{3}{y+2}\right)(y+2)$

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

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

$y = \frac{3}{x} - 2$ $x \neq 0$