7-4 Inverses **Jan 9, 2012** **std. 24.0**

Recall: *A function is a relation where each x is paired with exactly one y .*

$(x,y) \xrightarrow{\text{inv.}} (y,x)$

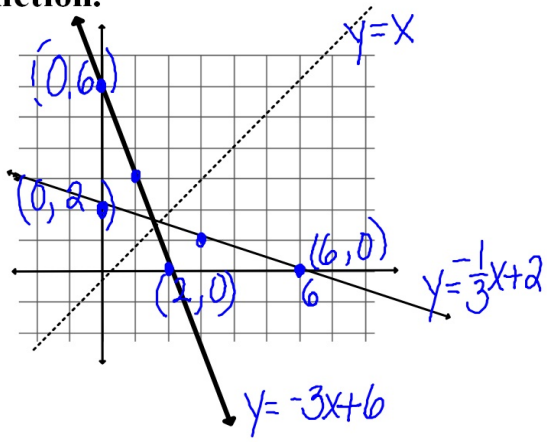
Find and graph the inverse of each function.

ex. 1 $y = -3x + 6$

$x = -3y + 6$

$x - 6 = -3y$

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



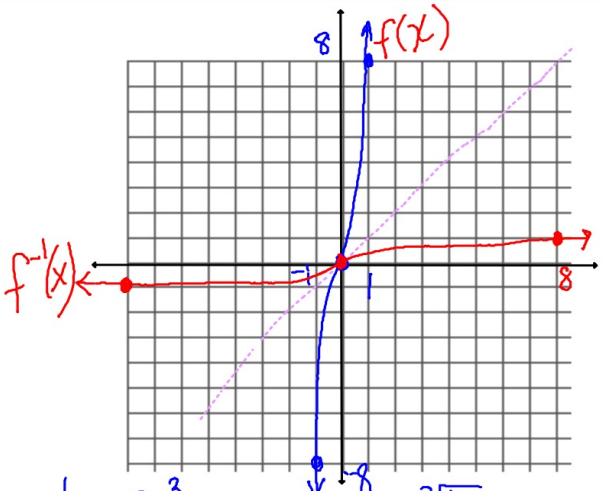
ex. 2 $f(x) = 8x^3$

$y = 8x^3$

$x = 8y^3$

$\sqrt[3]{\frac{x}{8}} = y$

inverse function of x $f^{-1}(x) = \frac{\sqrt[3]{x}}{2}$



x	$y = 8x^3$
0	0
1	8
-1	-8

x	$y = \frac{\sqrt[3]{x}}{2}$
0	0
8	1
-8	-1

Definition: **Functions f and g are inverses of each other if and only if $f(g(x)) = x$ and $g(f(x)) = x$.**

ex. 3 **Verify that $f(x) = \frac{1}{3}x^2 \ (x \geq 0)$ and $g(x) = (3x)^{1/2} \ (x \geq 0)$ are inverses of each other.**

(by defn)

$$f(g(x)) = f\left((3x)^{1/2}\right) = \frac{1}{3}\left(3^{1/2}x^{1/2}\right)^2 = \frac{1}{3}(3x) = x$$

$$g(f(x)) = g\left(\frac{1}{3}x^2\right) = \left(3 \cdot \frac{1}{3}x^2\right)^{1/2} = \left(x^2\right)^{1/2} = x$$