Day 8: Inverse of Linear and Quadratic Functions

Handout investigation of Inverse Functions.

**Note: $f^{-1}(x)$ means inverse of the function $f(x)$.

* To obtain the graph of the inverse we select points on our original graph and reverse their coordinates to obtain points on the graph of our inverse.

$(4, 5) \longrightarrow (5, 4)$

$(x, y) \quad\quad (y, x)$

$(7, 6) \longrightarrow (6, 7)$

* The graph of the inverse is a reflection of the original graph.

$f^{-1}(x) \longleftarrow$ inverse.

Coordinates original

x	$f(x)$
-2	-8
-1	-1
1	1
2	8
4	5

Inverse

x	$f^{-1}(x)$
-8	-2
8	2
-1	-1
1	1
5	4

Example: Calculate the equation of the inverse of each of the following.

$$y = 5 - 2x$$

1. Switch the position of x and y.
2. Solve the eqn for $\underline{\underline{y}}$.

$x = 5 - 2y$

$x - 5 = -2y$

$\frac{x-5}{-2} = y$

$$f(x) = \frac{2}{3}x + 7$$

$x = \frac{2}{3}y + 7$

$x - 7 = \frac{2}{3}y$

$3(x-7) = 2y$

$\frac{3(x-7)}{2} = y$

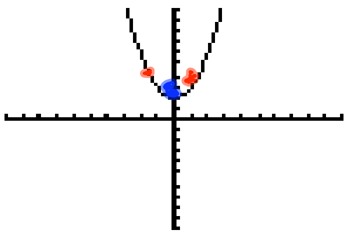
$$g(t) = \frac{4}{5}t - 3$$

$x = \frac{4}{5}y - 3$

$x + 3 = \frac{4}{5}y$

$\frac{5(x+3)}{4} = y$

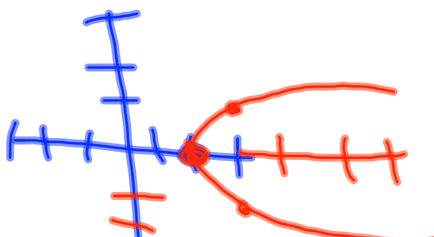
Is the following equation a function?



$$y = x^2 + 2$$

Yes because a vertical line only intersects our graph once.

Is it's inverse a function?



**Note: We would have to restrict it's domain in order for the inverse to be considered a function!!

If we only look at $x \geq 0$ then we have a fn.

Example: Calculate the equation of the inverse for each of the following.

$$y = x^2 - 2$$

$x = y^2 - 2$

$x + 2 = y^2$

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

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

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

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

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

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

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

$$y = 3x^2 + 4$$

$x = 3y^2 + 4$

$x - 4 = 3y^2$

$\frac{x-4}{3} = y^2$

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

Assignment:
Pg. 136 #1, 3odds, 5-7
Pg. 140 #2odd, 4-6