

## PC Lesson 1.5--Inverse Functions

Let  $f(x) = 2x + 6$ . Find  $f^{-1}(x)$ ?

STEPS: (1) switch  $x$  and  $y$   
(2) solve for  $y$

UDO:  $g(x) = x^3 - 1$ , Find  $g^{-1}(x)$ .

$\sqrt{\quad}$

$\sqrt{\quad}$

How to verify if 2 functions are inverses (algebraically):

$$[f \circ g](x) = x \text{ AND } [g \circ f](x) = x$$

You must actually show this algebraically!

EX:  $f(x) = 2x^3 - 1$  and  $g(x) = \sqrt[3]{\frac{x+1}{2}}$

Can you determine  $[f \circ g](x)$  and  $[g \circ f](x)$  ?

Determine if  $f(x)$  and  $g(x)$  are inverses (algebraically):

$$f(x) = \frac{x^3}{5} \quad \text{and} \quad g(x) = \sqrt[3]{5x}$$

What about  $f(x) = \sqrt[3]{3x - 10}$  and  $g(x) = x^3 + 10$ ?

Do you remember how the graphs of  $f$  and  $f^{-1}$  are related?

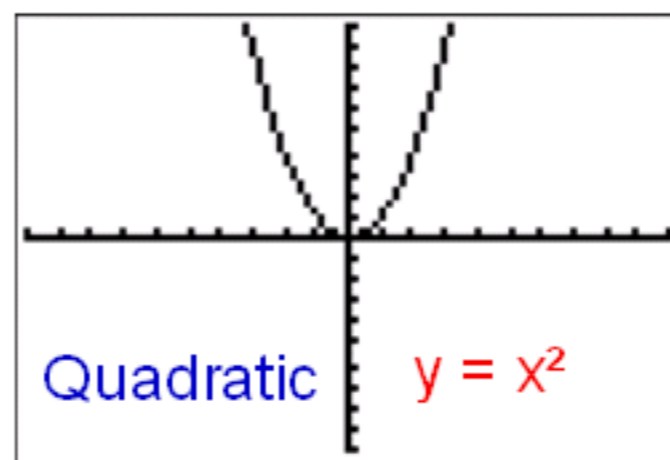
What test do you use to determine if a function has an inverse or not?

NOTE: All functions do not have an inverse...a function does not have an inverse unless the inverse relation is also a function itself.

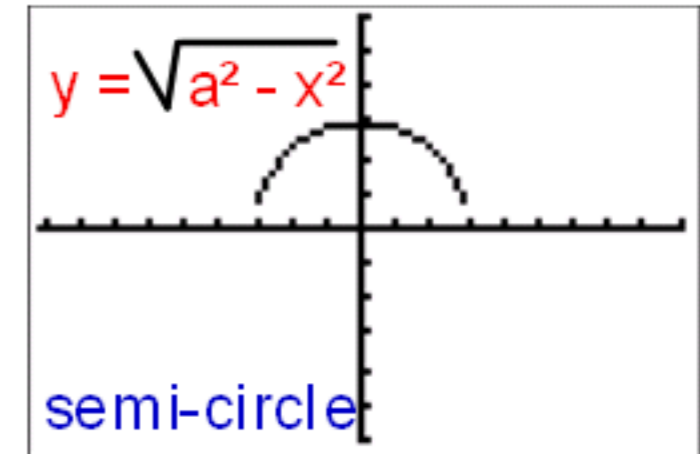
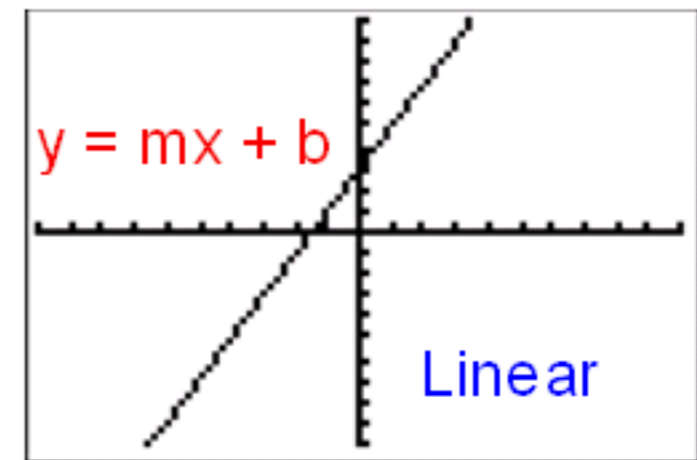
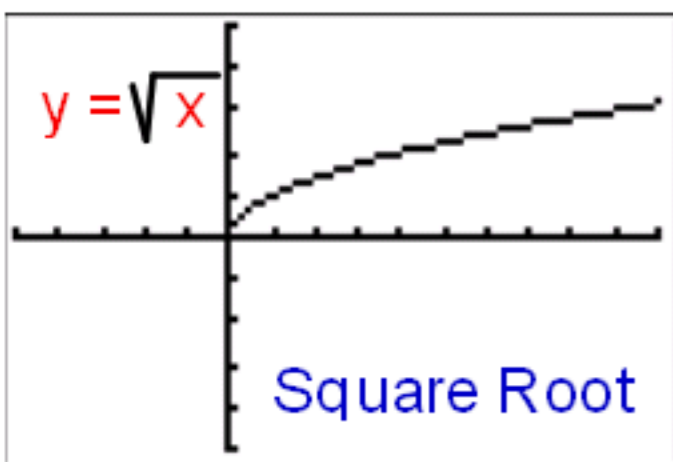
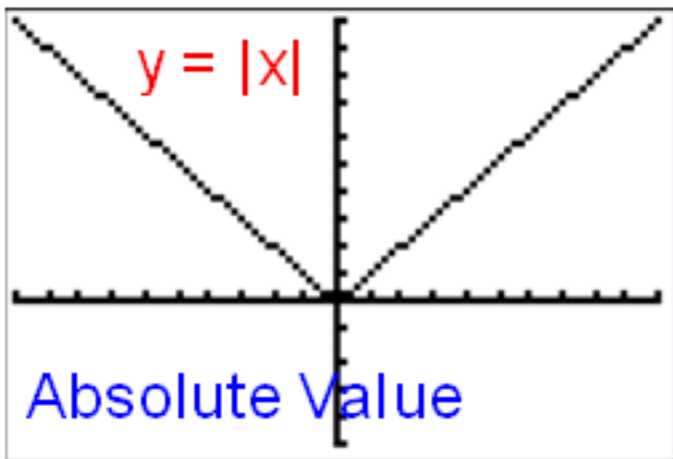
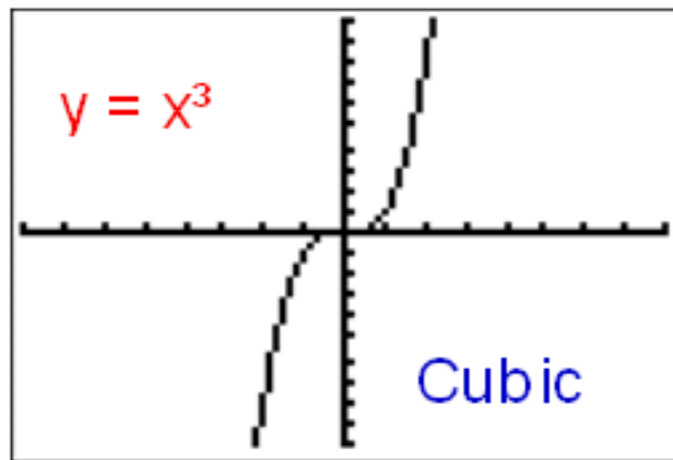
ex:  $f(x) = x^2$



$f(x)$  has no inverse!



If a function and its inverse are both functions then the relation is said to be one-to-one (1-1)



Let  $f(x) = \sqrt{x - 3}$ .

Find  $f^{-1}(x)$ .

Can you graph these 2 functions?

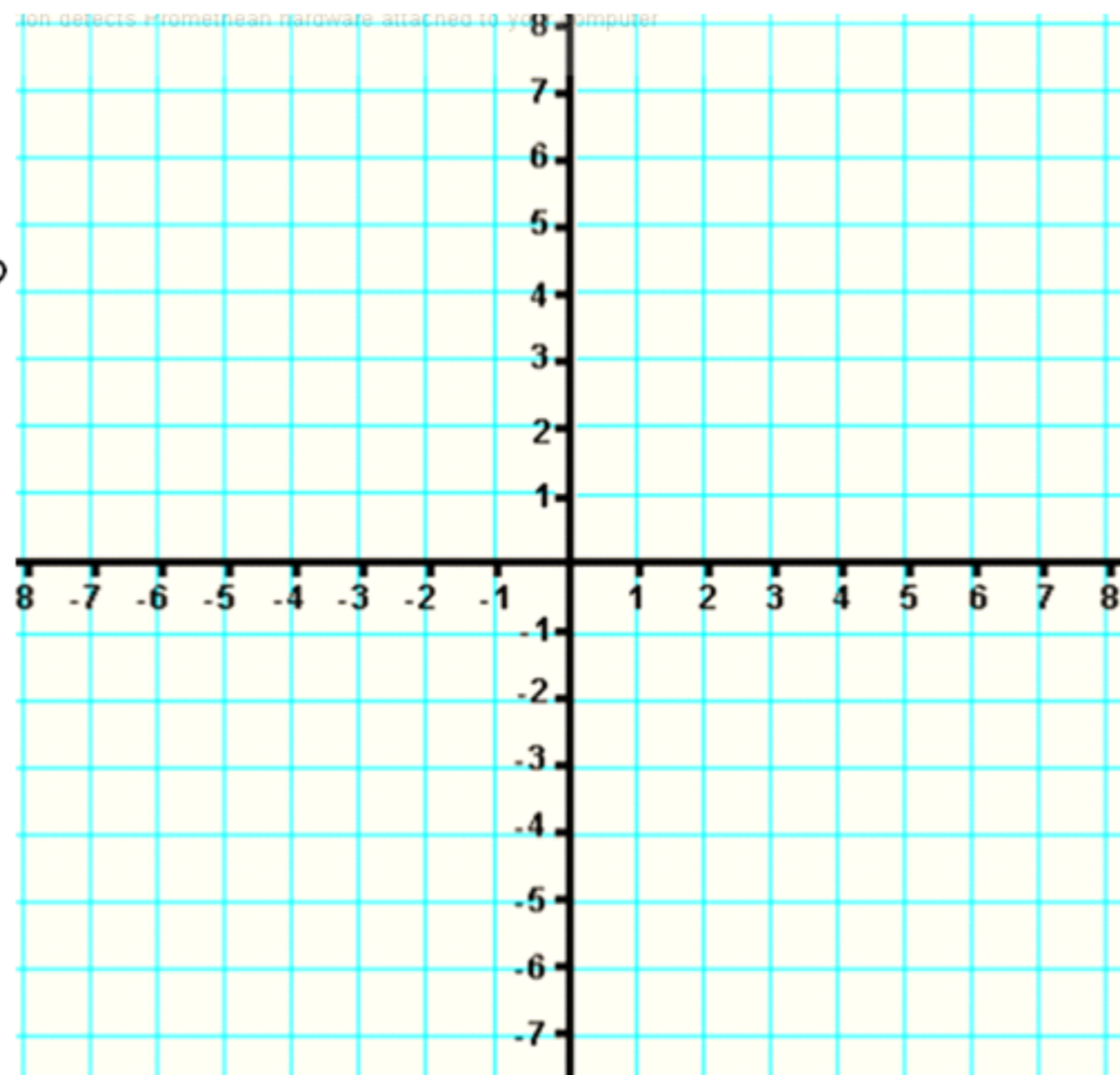
Can you tell me the domain and range?

D:

R:

D:

R:



Can this be done with the TI-83/84??

Will your GUT draw an inverse function?!

Let's try it! (see "study tip" on pg. 125)

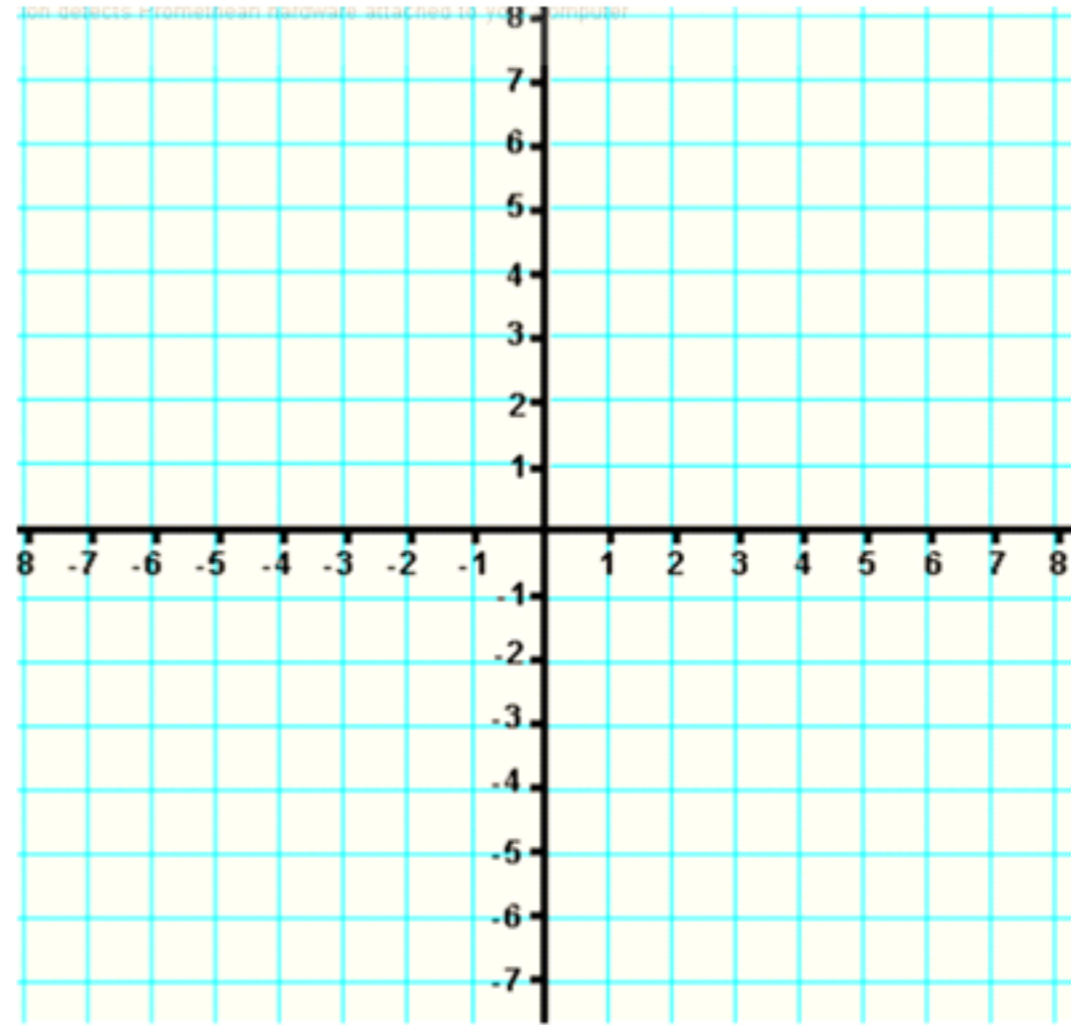
Graph  $y = x^3$  in Y1...on your GUT!

Use the "DRAW" feature to draw the inverse (#8)

## New challenge:

Let  $f(x) = |x|+3$

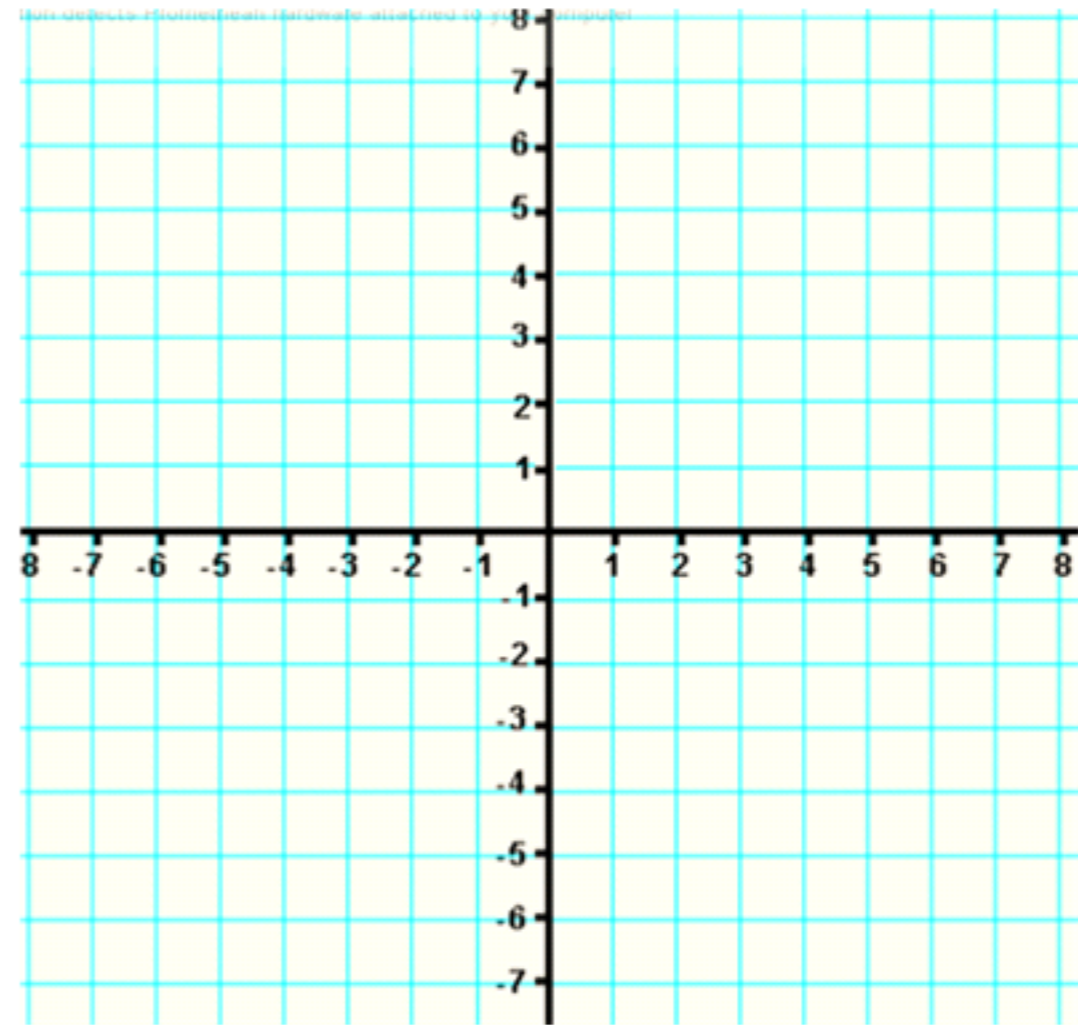
- (1) Graph  $f(x)$
- (2) Erase part of  $f(x)$  so that  $f^{-1}(x)$  exists
- (3) Rewrite  $f(x)$  with the restriction
- (4) Write  $f^{-1}(x)$  algebraically
- (5) Graph  $f^{-1}(x)$  on same set of axes as  $f(x)$ .



## New challenge:

Let  $f(x) = |x+2|$

- (1) Graph  $f(x)$
- (2) Erase part of  $f(x)$  so that  $f^{-1}(x)$  exists
- (3) Rewrite  $f(x)$  with the restriction
- (4) Write  $f^{-1}(x)$  algebraically
- (5) Graph  $f^{-1}(x)$  on same set of axes as  $f(x)$ .



## Chapter One Overview:

Function or not?

Piecewise functions...with and without GUT

Domain, domain, domain...given equation OR graph

Difference quotient

WORD PROBLEMS...with and without GUT

Increasing or decreasing...with and without GUT

Maximum and minimum...with and without GUT

Where is  $f(x) \geq 0$  or  $f(x) \leq 0$

Reflecting, shifting and stretching graphs

Adding, subtracting, multiplying & dividing functions

Composition of 2 functions

Inverse functions