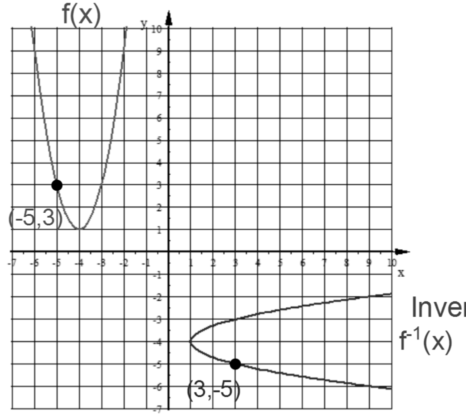
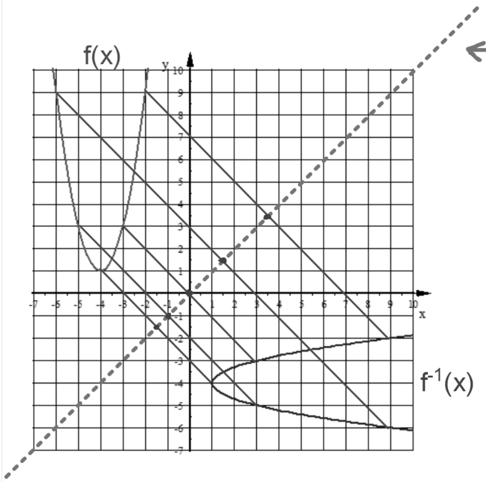
To make the graph of the inverse of a relation you take each point on the original relation, switch the x and y coordinates, then replot them.

Original Relation



$f^{-1}(x)$ is the notation we use to represent the inverse of f(x).
It doesn't represent an exponent.



← Line of Reflection

f^{-1} is a reflection of f(x) over the line:

$$y = x$$

The concept of an Inverse Relation is all about...

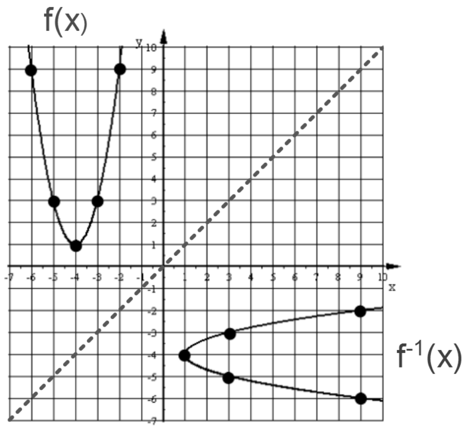
switching X and Y

To draw the inverse relation. Depending on what version of the Ti-84 you have use these key strokes:

1. Press 2nd
2. Press PRGM (DRAW)
3. Choose option 8: DrawInv
4. Press ALPHA then TRACE
5. Choose Y_1
6. Press ENTER

OR

4. Press VARS
5. Arrow to Y-VARS
6. Choose 1: Function
7. Choose: Y_1
8. Press ENTER

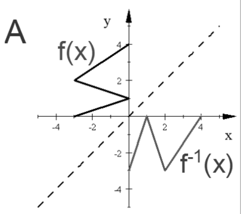


Is $f^{-1}(x)$ a function?

No, the inverse f^{-1} doesn't pass the vertical line test.

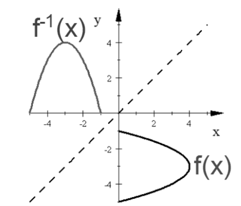
Is the inverse of each relation a function?

A



Yes, f^{-1} is a function

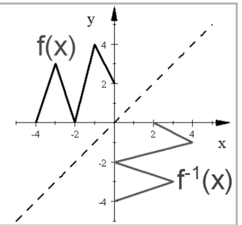
B



Yes, f^{-1} is a function

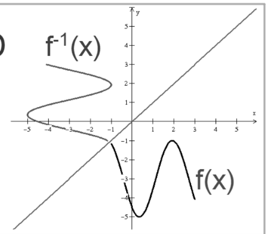
Is the inverse of each relation a function?

C



No, f^{-1} is NOT a function

D



No, f^{-1} is NOT a function

Given the graph of an orginal relation, how do you tell if the inverse relation is a function without actually graphing the inverse?

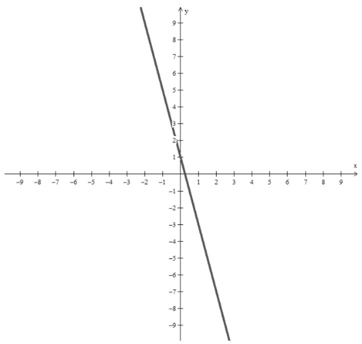
Horizontal Line Test: a visual test to determine if the inverse relation will be a function.

If any horizontal line can intersect a relation more than once then the graph of the inverse is NOT a function

3. Use what you may know about the graph of each or graph them using the graphing calculator to determine if the inverse relation of each is a function or not.

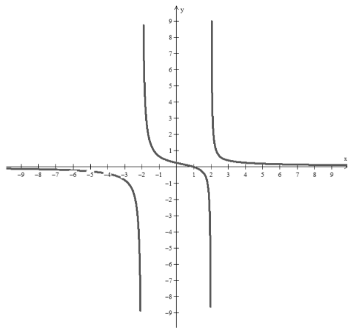
a) $f(x) = -4x + 1$

Yes, the inverse is a function because no Horizontal Line will touch the orginal graph more than once so no Vertical Line will touch the inverse more than once.



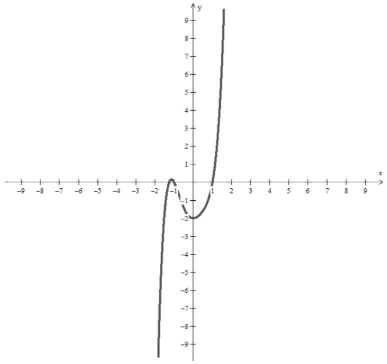
b) $y = \dfrac{x-1}{x^2-4}$

No, the inverse is not a function because there is a Horizontal Line that will touch the orginal graph more than once which means that there is Vertical Line that will touch the inverse more than once.



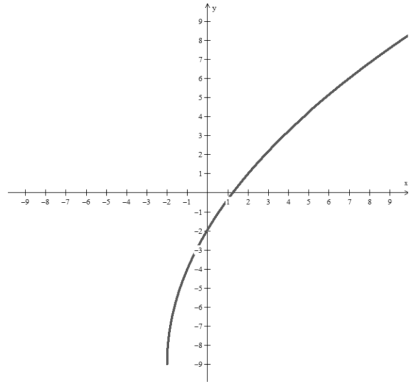
c) $y = x^5 - x^3 + 2x^2 - 2$

No, the inverse is not a function because there is a Horizontal Line that will touch the orginal graph more than once which means that there is Vertical Line that will touch the inverse more than once.



d) $f(x) = 5\sqrt{x+2} - 9$

Yes, the inverse is a function because no Horizontal Line will touch the orginal graph more than once so no Vertical Line will touch the inverse more than once.



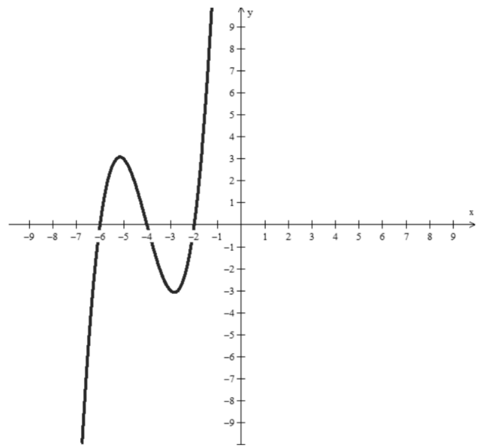
e) f(x) = $-x^4 + 7x^3 + 8x - 9$

Without graphing you can tell that the inverse of this relation is NOT a function. Since f(x) is a Negative Even function the end-behavior is (↙,↘), which tells us that it will fail the Horizontal Line Test.

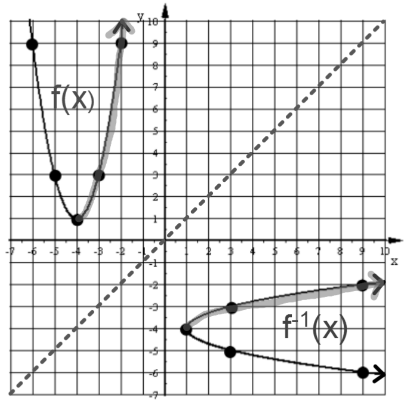
e) Is the inverse relation of each a function?

$y = x^3 + 12x^2 + 44x + 48$

No, the inverse is not a function because there is a Horizontal Line that will touch the orginal graph more than once which means that there is Vertical Line that will touch the inverse more than once.



To make $f^{-1}(x)$ a function we must "cut off" part of $f(x)$.



If we cut off the left side of f(x) what does $f^{-1}(x)$ look like?

the top half of a sideways parabola

What is the domain and range of this new f(x)?

D: $x \geq -4$ R: $y \geq 1$

What is the domain and range of this new $f^{-1}(x)$?

D: $x \geq 1$ R: $y \geq -4$

Original Relation		Inverse Relation
f(x)	Becomes	$f^{-1}(x)$
The point (a,b)	Becomes	The point (b,a)
Domain of f(x)	Becomes	Range of $f^{-1}(x)$
Range of f(x)	Becomes	Domain of $f^{-1}(x)$
Graph of f(x)	Reflect over y=x Becomes	Graph of $f^{-1}(x)$