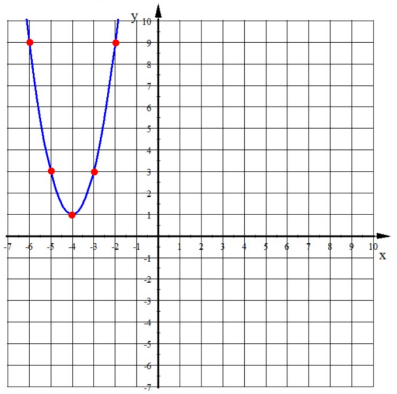
Sec 7-7 Inverse Relations and Functions

What is a Relation? A set of ordered pairs (a bunch of points)

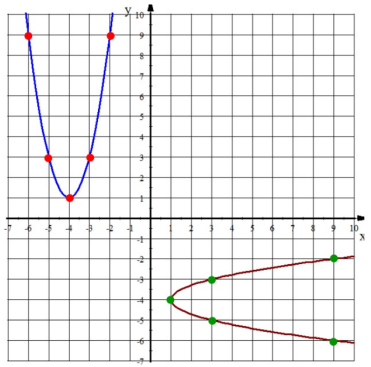
What is a function?

A relation such that every x-value is paired with one and only one y-value.

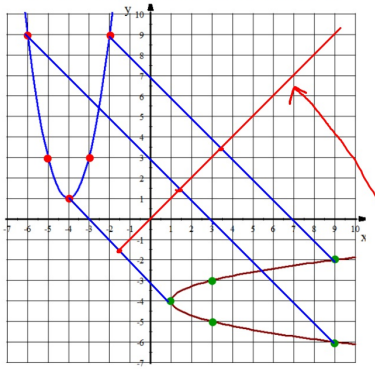
1. Use these points: $(-6,9),(-5,3),(-4,1),(-3,3),(-2,9)$
Plot the following points and connect them to form a parabola.



2. Take each ordered pair and switch the position of each number then plot this point on the same graph that you used for the parabola. Do this with all five points and connect them with a smooth curve. Example: (-6,9) becomes (9,-6)

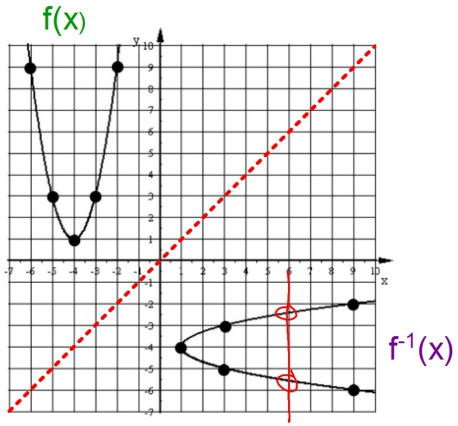


3. You have just created the inverse relation of f(x). The inverse is denoted by the symbol $f^{-1}(x)$
The graph of $f^{-1}(x)$ is actually a reflection of f(x) over a line. What is this line of reflection?
(Remember, a Line of Reflection is the line that is equidistant from corresponding points on f(x) and $f^{-1}(x)$.
i.e. it's exactly in the middle of the two graphs)



To find the Line of Reflection connect corresponding points on the original and the image (inverse relation) then find the midpoints of these segments. The Line of Reflection is the line that connects these midpoints.

Line of Reflection: y = x



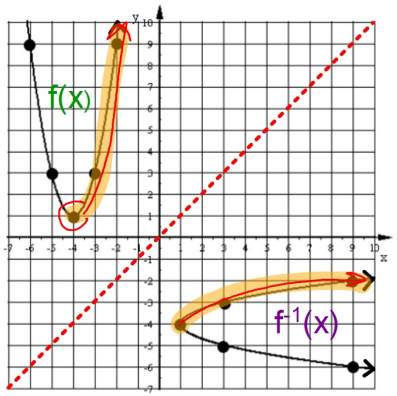
Is $f^{-1}(x)$ a function?

No, the inverse relation doesn't pass the Vertical Line Test.

What I want you to know from Sec 7-7:

1. Given an original relation be able to tell if the inverse is a function or not.
2. Know the relationship between the Domain and Range of an original relation and the Domain and Range of the inverse relation.
3. Be able to write the equation of the inverse relation.

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?

It looks like the top half of a sideways parabola.

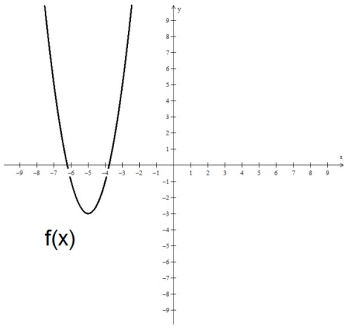
What is the domain and range of this new f(x)? $x \geq -4$ $y \geq 1$

What is the domain and range of this new $f^{-1}(x)$? $x \geq 1$ $y \geq -4$

Graphing an inverse on the graphing calculator.

Graph the following in a Standard Window.

$Y_1 = 2(x+5)^2 - 3$



To draw the inverse relation:

If using the newer version of the Ti-84:

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

To draw the inverse relation:

If using the older version of the Ti-84:

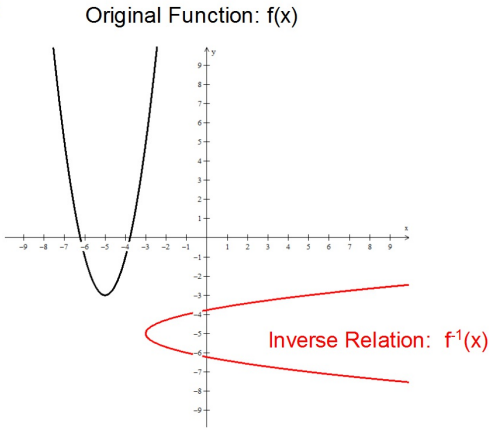
1. Press 2nd
2. Press PRGM (DRAW)
3. Choose option 8: DrawInv
4. Press VARS then
5. Arrow to the right: Y-VARS
6. Choose 1:Functions
7. Choose 1:Y_1
8. Press ENTER

Is the inverse relation to

$Y_1 = 2(x+5)^2 - 3$

a function?

No, the inverse relation doesn't pass the Vertical Line Test.

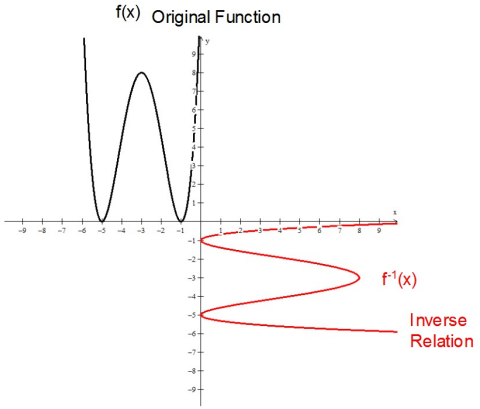


Is the inverse relation to

$Y = 0.5(X+5)^2(X+1)^2$

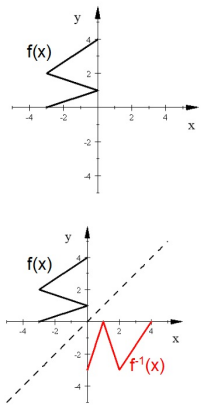
a function?

No, the inverse is not a function because it doesn't pass the Vertical Line Test.



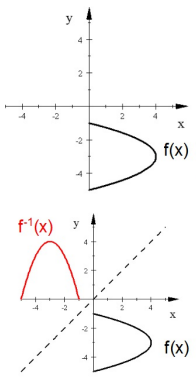
Given the original relation f(x) will the inverse relation $f^{-1}(x)$ be a function?

A



Yes

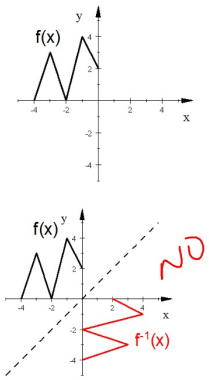
B



Yes

Given the original relation f(x) will the inverse relation $f^{-1}(x)$ be a function?

C



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