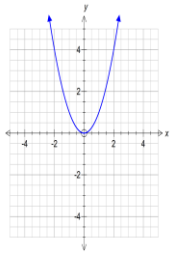
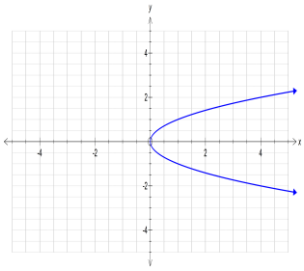
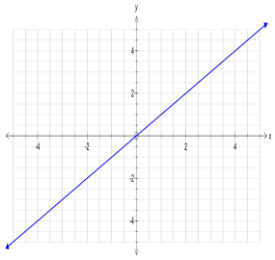
Notes Inverse Function

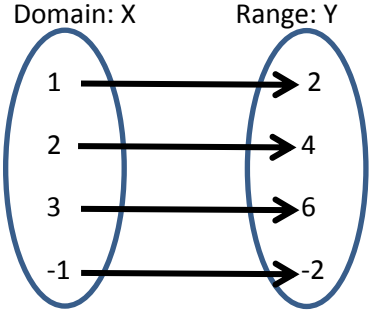
Recall a relation is a function if each value in the domain corresponds with exactly one value in the range. Graphically we said that a relation was a function if it passed the vertical line test.

Use the vertical line test to determine if the following relations are functions.

EX1:	EX2:	EX3:
		

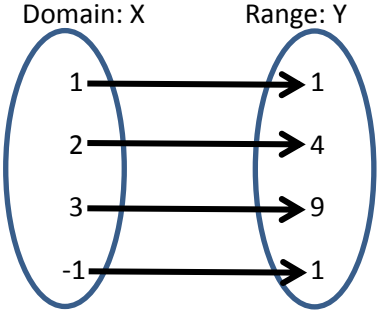
A function is said to be ONE-TO-ONE if and only if every value for y corresponds to only one x-value.

Domain: X Range: Y



Is the function one-to-one?:_____

Domain: X Range: Y

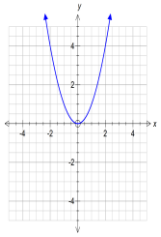
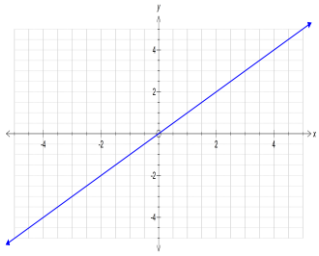
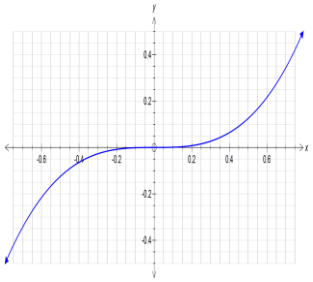


Is the function one-to-one?: _____

We could use the horizontal line test to determine if a function is one-to-one.

- Horizontal line test: If you can draw a horizontal line and cross the graph of a function in at most one place, then the function is one-to-one.

Use the horizontal line test to determine if the following functions are one-to-one.

EX4:	EX5:	EX6:
		

Only ONE TO ONE functions have inverses.

- The functions $f(x)$ and $g(x)$ are inverses if and only if $f(g(x)) = x$ AND $g(f(x)) = x$.

Determine if the following functions are inverses:

EX7: $f(x) = 2x$ and $g(x) = \frac{x}{2}$

EX8: $f(x) = \frac{1}{4}x - 5$ and $g(x) = 4x - 20$

Ex9: $f(x) = \sqrt[3]{x+5}$ and $g(x) = x^3 - 5$

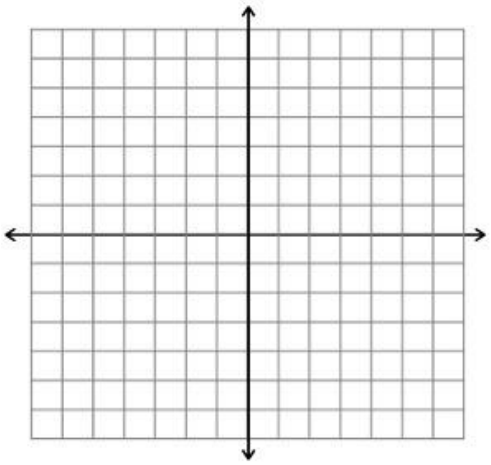
Think of the inverse of a function as the "reverse" of that function. The inverse function UNDOES the operations that were done on the function.

<u>To find the inverse of a function:</u>

1) Replace $f(x)$ with **y**
2) Swap the **x** and the **y**
3) Solve for **y**
4) Replace y with $f^{-1}(x)$ (Note: $f^{-1}(x)$ is said f inverse of x, ***<u>NOT</u>*** f to the negative one.)

Find the inverse of the one-to-one function. Graph both the function & its inverse on the same axes.

EX10: $f(x)=2x-4$



Properties of inverse functions:

i. $f(f^{-1}(x))=x$ and $f^{-1}(f(x))=x$

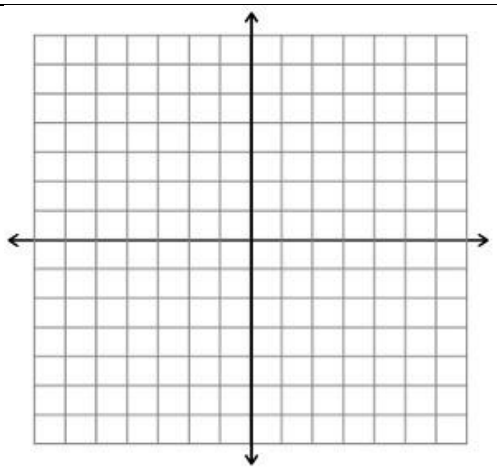
ii. $f(x)$ and $f^{-1}(x)$ are reflections of each other with respect to the line $y=x$

iii. The domain of $f(x)$ is the range of $f^{-1}(x)$

iv. The range of $f(x)$ is the domain of $f^{-1}(x)$

Find the inverse of the one-to-one function. Graph both the function & its inverse on the same axes.

EX11: $f(x)=\sqrt[3]{x+1}$



EX12: $f(x)=\sqrt{x-2}$