Inverse Functions Video Lecture

Section 12.2

Course Learning Objective:

Demonstrate appropriate manipulation of function notation and be able to find the domain, range, and inverse of a function.

Weekly Learning Objectives:

1) **Determine whether a function is a one-to-one function.**
2) **Use the horizontal line test to decide whether a function is a one-to-one function.**
3) **Find the inverse of a function.**
4) **Find the equation of the inverse of a function.**
5) **Graph functions and their inverses.**

Inverse Functions

Let f(x) = $\{(-2,1), (5,4), (3,1), (6,2)\}$

The inverse relation will be:

In order for a relation to be a function, each x-value can only be used once.

The graph of a function must pass the Vertical Line Test.

Vertical Line Test: If every vertical line intersects the graph at most once, then the graph is the graph of a function.

In order for a function to have an inverse function, each y-value can only be used once.

The graph of a function will have an inverse if it passes the Horizontal Line Test.

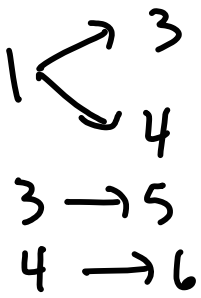
Horizontal Line Test: If every horizontal line intersects the graph of a function at most once, then the function has an inverse and is one-to-one.

One-to-One: For every x-value, there is one and only one y-value. If a function is one-to-one, then it has an inverse function.

Are the following relations one-to-one?

$1 \to 5$
$2 \to 6$
$3 \to 4$
$4 \to 3$

$1 \to 5$
$2 \to 6$
$3 \to 4$
$4 \nearrow$



$f(x) = x^2 + 2$

Verify that the function is 1-1 and find its inverse:

$f: \{(1,3), (2,4), (0,-3)\}$

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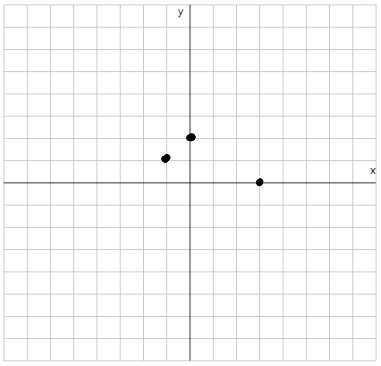


How to determine the inverse function of f(x):

1) **Verify that f(x) is 1-1**
2) **Change f(x) to y**
3) **Swap x and y**
4) **Solve for y in terms of x**
5) **Change y to**

Find the inverse of the functions:

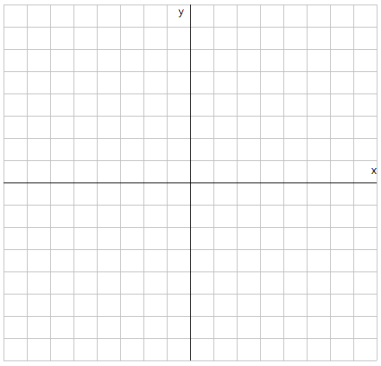
$f(x) = 2x + 1$

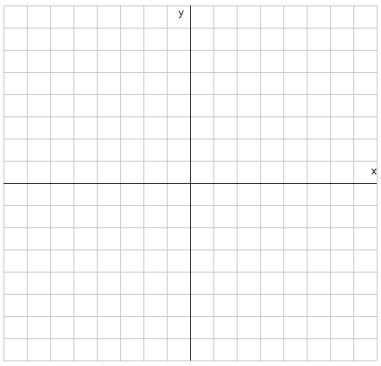
$f(x) = 2x^3 - 3$

Graph f(x) and its inverse on the same set of axes.

f(x) = 2x - 3

f(x) = $-\sqrt{x}$





If f(3) = 6 , what is $f^{-1}(6)$?

Considering the function graphed below, find $f^{-1}(4)$.