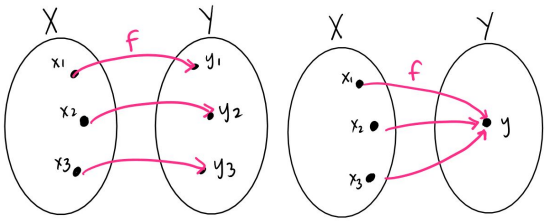
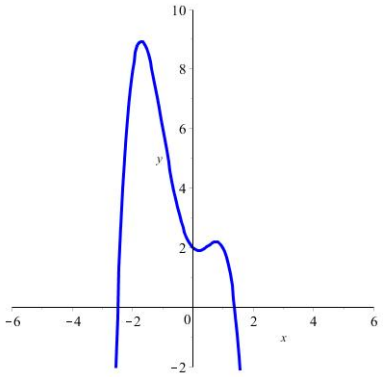
Math 1314 – College Algebra
Section 3.7 Inverse Functions

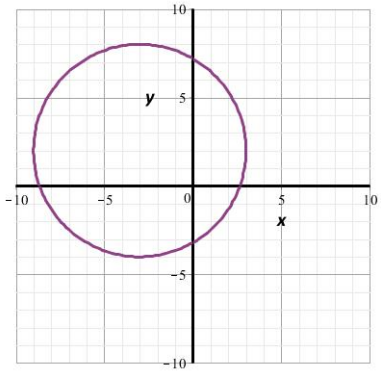
Recall:

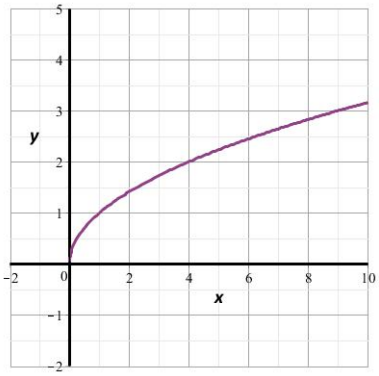
A function f from a set A to a set B is <u>one-to-one</u> if and only if different numbers in the domain of f have different outputs in the range of f.
1-1: If x_1 and x_2 are in the domain of f and $x_1 \neq x_2$, then $f(x_1) \neq f(x_2)$.



- We can test to determine if a graph represents a function using the Horizontal Line Test. Are the following graphs of 1-1 functions?







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

- If f is a 1-1 function with domain A and range B, then the inverse of f, f^{-1}, has domain _____ and range _____.
- We write:
- NOTE:

■ Finding the Inverse of a 1-1 Function:

Ex: Find the inverse of $f(x) = \frac{2}{3}x + 4$.

1. Let $y = f(x)$
2.
3.
4.

- NOTE: $(f \circ f^{-1})(x) =$ and $(f^{-1} \circ f)(x) =$ if
- Summary of Cool Stuff about Inverses:
  - Domain of f
  - If (a,b) is on the graph of f,
  - Graphs of f and $f^{-1}(x)$ are
  - $(f \circ f^{-1})(x) =$ AND $(f^{-1} \circ f)(x) =$

Ex: Does $f(x) = x^2 + 2$ have an inverse?

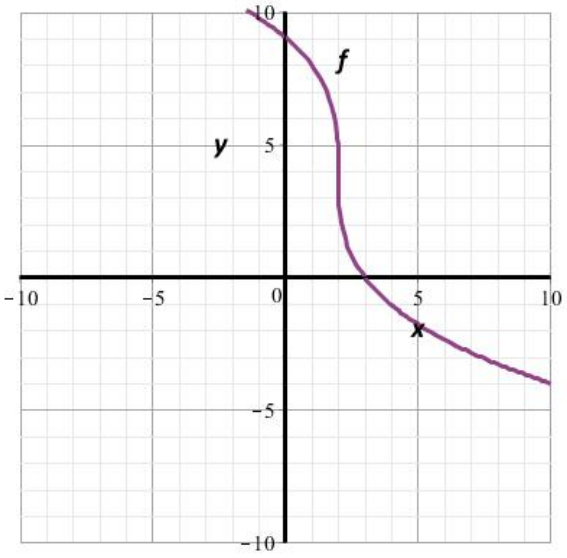
Where is f one-to-one and non-increasing?

One-to-one and non-decreasing?

Ex: Does $f(x) = x^2 + 2, \quad x \leq 0$ have an inverse? If so, find $f^{-1}(x)$, the domain and range of each, and graph both.

f :Domain: f^{-1} :Domain:
f :Range: f^{-1} :Range:

Ex: Given the graph of the function below, answer the following questions.



(a) Is f one-to-one?

(b) Find $f(10)$

(c) Find $f^{-1}(8)$

(d) Find $f(0)$

(e) Find $f^{-1}(0)$

(f) Find $f^{-1}(-4)$

(g) Solve $f^{-1}(x) = 5$

(h) Find $(f \circ f^{-1})(0)$

(i) Find $(f^{-1} \circ f)(0)$

(j) Plot $f^{-1}(x)$ on the same set of axes.

Ex: If $f(x) = \dfrac{2x}{x-3}$, find f^{-1}. Find the domain and range of both.

f :Domain: f^{-1} :Domain:

f :Range: f^{-1} :Range: