

Math 1050 ~ College Algebra

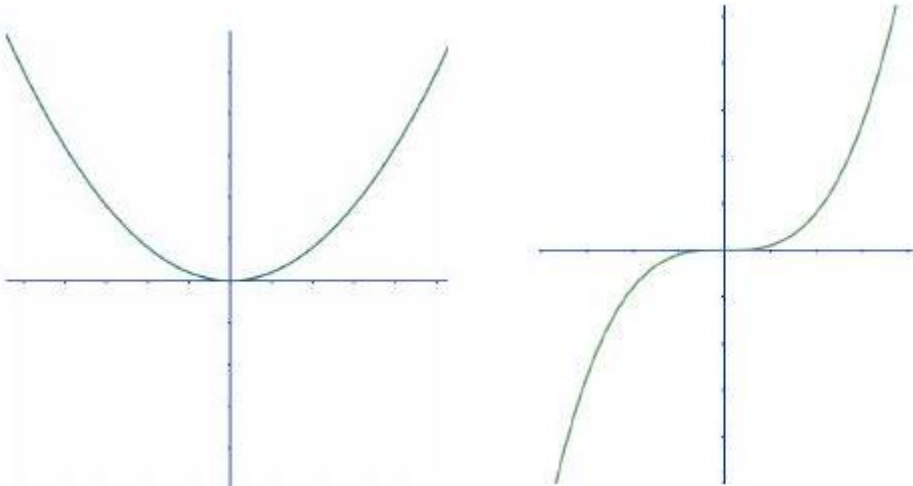
5 Inverses of Functions

Inverse Function

If f and g are functions such that

- $(f \circ g)(x) = x$ for all x in the domain of g
- $(g \circ f)(x) = x$ for all x in the domain of f
then f and g are inverses of each other.
This is written $f^{-1}(x) = g(x)$ and $g^{-1}(x) = f(x)$.

To have an inverse, a function must be one-to-one, that is for each output there must be exactly one input.



Finding an Inverse Function

Strategy

EX 1

For $f(x)$, find the inverse function, $f^{-1}(x)$.

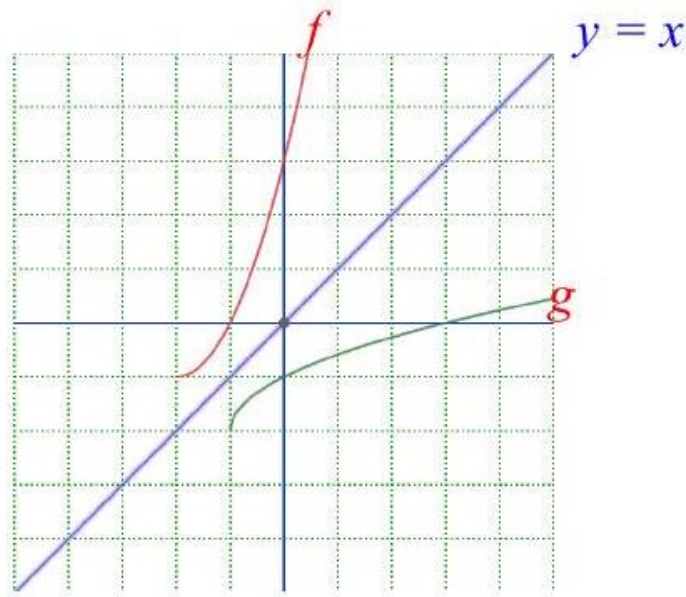
1a) $f(x) = \frac{x^5-1}{3}$

1b) $f(x) = \sqrt[3]{x+2} + 1$

Graphical Properties of Inverse Functions

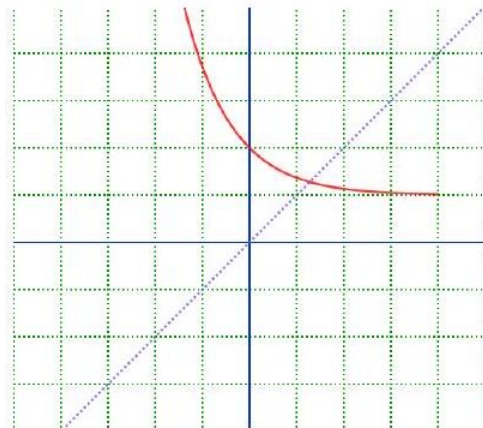
Assume f and g are inverse functions.

- The domain of f is the range of g and the domain of g is the range of f .
- $f(a) = b$ if and only if $g(b) = a$.
- (a, b) is on the graph of f if and only if (b, a) is on the graph of g .
- f and g are symmetric about the line $y = x$.



EX 2

Sketch the inverse, f^{-1} , of f on the same axes. State the domain and range of each.



EX 3

Show that these two functions are inverses in two ways.

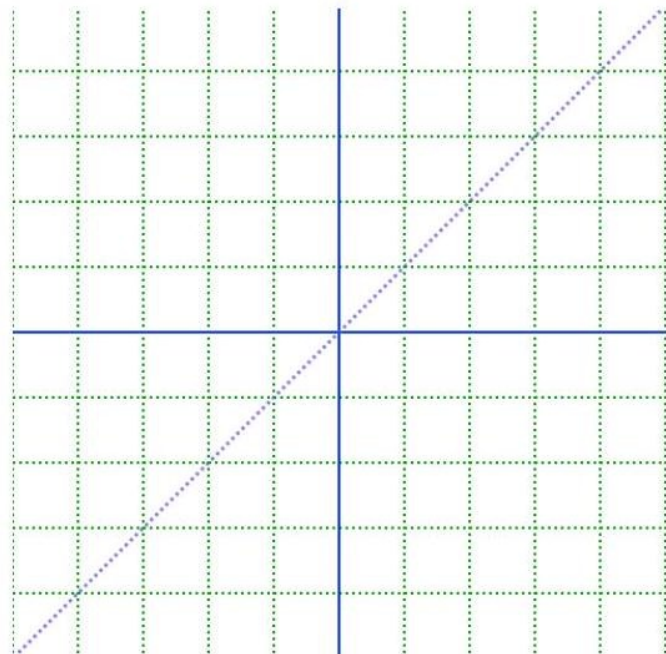
$$g(x) = \frac{1-x}{x}, 0 < x \leq 1 \quad f(x) = \frac{1}{1+x}, x \geq 0$$

3a)

Algebraically

3b)

Graphically



EX 4

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