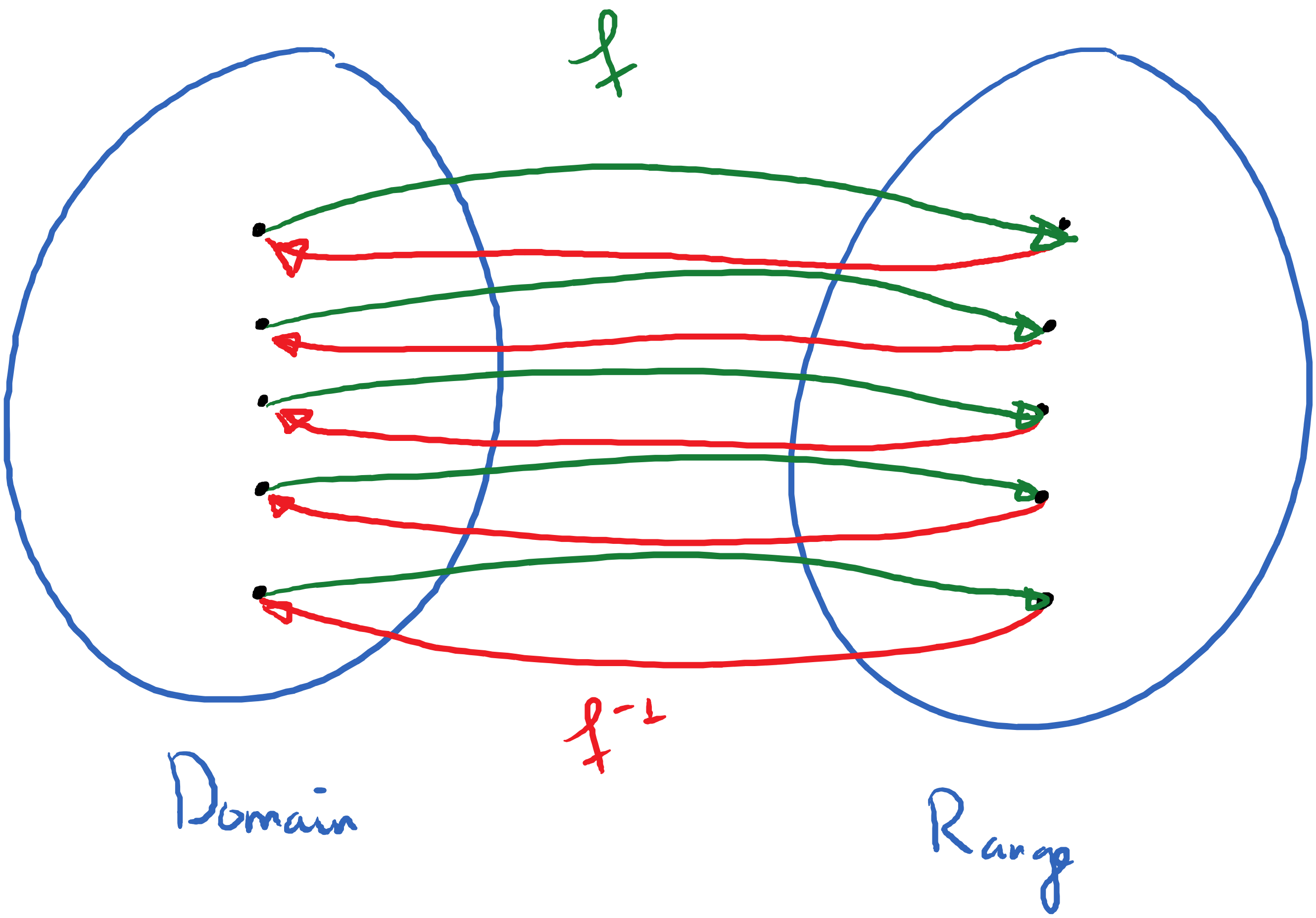
6.1-Inverse Trig Functions

Wednesday, November 15, 2017 9:15 AM

Obj 1: Brief Review of Functions and Inverse

Functions



$f(x) = x^3 + 1$

f is a 1-to-1 function. It has an inverse function.

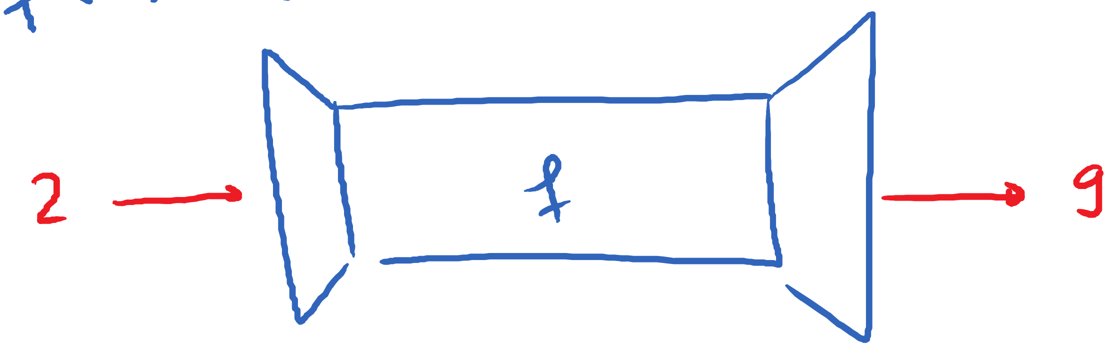
The inverse function is denoted as $f^{-1}(x)$.

Note: $f^{-1}(x)$ DOES NOT MEAN $\dfrac{1}{f(x)}$

$f(x)$

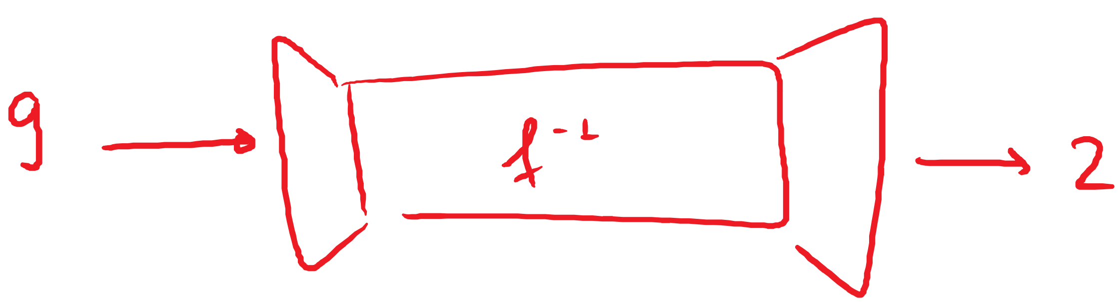
If $f(x) = x^3 + 1$, then $f^{-1}(x) = \sqrt[3]{x-1}$

$f(2) = (2)^3 + 1 = 9$

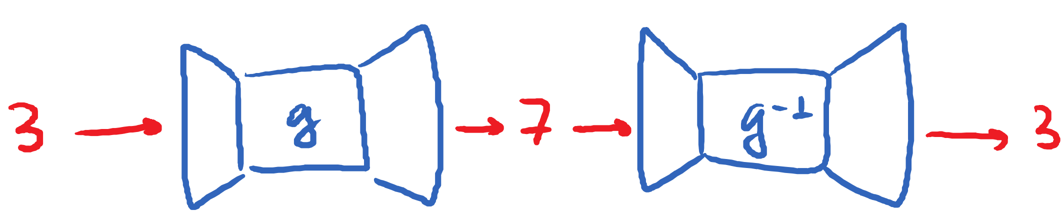


$f^{-1}(x) = \sqrt[3]{x-1}$

$f^{-1}(9) = \sqrt[3]{9-1} = \sqrt[3]{8} = 2$



$g(x) = 2x + 1$. $\quad g^{-1}(x) = \dfrac{x-1}{2}$



<u>Key</u>: The inverse function undoes what the original function does

<u>Obj 2</u>: Inverse sine function.

The inverse sine function: $y = \sin^{-1} x$ or

$y = \arcsin x$ takes a number x in $[-1, 1]$

and gives us an angle y whose sine is

equal to x. (in radian) in $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$

<u>E.g.</u> Find $\arcsin(0)$

$\boxed{0}$ $\quad \cancel{\pi} \quad \cancel{2\pi} \quad \cancel{-\pi} \quad \cancel{3\pi}$

$$\boxed{\arcsin(0) = 0}$$

* $\arcsin(1) = \frac{\pi}{2}$

* $\arcsin(-1) = -\frac{\pi}{2}$

* $\arcsin\left(\frac{\sqrt{2}}{2}\right) = \frac{\pi}{4}$

* $\arcsin\left(\frac{\sqrt{3}}{2}\right) = \frac{\pi}{3}$

* $\arcsin\left(-\frac{1}{2}\right) = -\frac{\pi}{6}$.

* $\arcsin\left(\frac{1}{2}\right) = \frac{\pi}{6}$

($\arcsin\left(\frac{1}{2}\right)$ gives us an angle in $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$ whose sine equals to $\frac{1}{2}$. That angle is $\frac{\pi}{6}$.

* $\arcsin(-2)$ is undefined.

Graph the $y = \arcsin x$ function.

Domain: $[-1, 1]$. Range: $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$

x	$y = \arcsin x$
-1	$-\frac{\pi}{2}$
$-\frac{\sqrt{2}}{2}$	$-\frac{\pi}{4}$
0	0
$\frac{\sqrt{2}}{2}$	$\frac{\pi}{4}$
1	$\frac{\pi}{2}$