

PreCalculus Class Notes TEI3 Inverse Trigonometric Functions

A function has an inverse only if it is one-to-one (passes the horizontal line test).

	$y = \sin x$	$y = \cos x$	$y = \tan x$
One to one			
Restricted domain	$[-\frac{\pi}{2}, \frac{\pi}{2}]$	$[0, \pi]$	$(-\frac{\pi}{2}, \frac{\pi}{2})$
Inverse: $r_{y=x}$			
Domain: Range:	$-1 \leq x \leq 1$ $[-\frac{\pi}{2}, \frac{\pi}{2}]$ QI and QIV	$-1 \leq x \leq 1$ $[0, \pi]$ QI and QII	$(-\infty, \infty)$ $(-\frac{\pi}{2}, \frac{\pi}{2})$ QI and QIV
Equation	$y = \sin^{-1} x$ $y = \arcsin x$ $x = \sin y$	$y = \cos^{-1} x$ $y = \arccos x$ $x = \cos y$	$y = \tan^{-1} x$ $y = \arctan x$ $x = \tan y$

~~$\sin^{-1} x = \frac{1}{\sin x} = \csc x$~~

~~$\arcsin x = \csc x$~~

$\sin^{-1} x = \text{inverse } \sin x$

number⁻¹ = reciprocal
 variable⁻¹ = reciprocal

$f = x^2$
 $f^{-1} = \sqrt{x}$

$f^{-1} = \text{inverse function}$

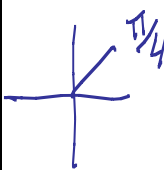

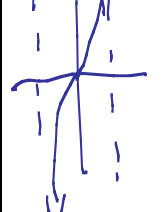
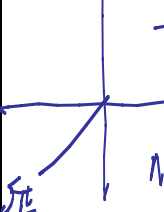
$$f(f^{-1}(x)) = x = f^{-1}(f(x))$$

$$\ln e^x = x = e^{\ln x}$$

$\sin^{-1}(\sin x) = x$ for $-\frac{\pi}{2} \leq x \leq \frac{\pi}{2}$	$\cos^{-1}(\cos x) = x$ for $0 \leq x \leq \pi$
$\sin(\sin^{-1} x) = x$ for $-1 \leq x \leq 1$	$\cos(\cos^{-1} x) = x$ for $-1 \leq x \leq 1$

$\tan^{-1}(\tan x) = x$ for $-\frac{\pi}{2} < x < \frac{\pi}{2}$
$\tan(\tan^{-1} x) = x$ for all real numbers x

Evaluate each expression.

 $\sin^{-1}\left(\sin \frac{\pi}{4}\right)$ $\frac{\pi}{4}$	 $\cos(\cos^{-1}(-3))$ <p>DNE</p> <p>$\cos \theta = -3$</p>
 $\tan^{-1}\left(\tan \frac{\pi}{2}\right)$ <p>undefined</p> <p>DNE</p>	 $\sin^{-1}\left(\sin \frac{5\pi}{4}\right)$ <p>$-\frac{\pi}{2} \leq \theta \leq \frac{\pi}{2}$</p> <p>$\frac{7\pi}{4}$</p>

