Inverse Trig Functions Reference Sheet

Standard Restricted Domains		
Function	**Domain**	**Range**
$sin(x)$	$[\frac{-\pi}{2}, \frac{\pi}{2}]$	$[-1, 1]$
$cos(x)$	$[0, \pi]$	$[-1, 1]$
$tan(x)$	$(\frac{-\pi}{2}, \frac{\pi}{2})$	$(-\infty, \infty)$
$cot(x)$	$(0, \pi)$	$(-\infty, \infty)$
$sec(x)$	$[0, \frac{\pi}{2}) \cup (\frac{\pi}{2}, \pi]$	$(-\infty, -1] \cup [1, \infty)$
$csc(x)$	$[-\frac{\pi}{2}, 0) \cup (0, \frac{\pi}{2}]$	$(-\infty, -1] \cup [1, \infty)$

Definitions of the Inverse Functions

When the trig functions are restricted to the domains above they become one-to-one functions, so we can define the inverse functions. For the sine function we use the notation $sin^{-1}(x)$ or $arcsin(x)$. Both are read "arc sine" . Look carefully at where we have placed the -1. Written this way it indicates the *inverse of the sine function.* If, instead, we write $(sin(x))^{-1}$ we mean the fraction $\frac{1}{sin(x)}$. The other functions are similar.

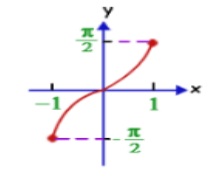
The following table summarizes the domains and ranges of the inverse trig functions. Note that for each inverse trig function we have simply swapped the domain and range for the corresponding trig function.

Standard Restricted Domains		
Function	**Domain**	**Range**
$sin^{-1}(x)$	$[-1, 1]$	$[\frac{-\pi}{2}, \frac{\pi}{2}]$
$cos^{-1}(x)$	$[-1, 1]$	$[0, \pi]$
$tan^{-1}(x)$	$(-\infty, \infty)$	$(\frac{-\pi}{2}, \frac{\pi}{2})$
$cot^{-1}(x)$	$(-\infty, \infty)$	$(0, \pi)$
$sec^{-1}(x)$	$(-\infty, -1] \cup [1, \infty)$	$[0, \frac{\pi}{2}) \cup (\frac{\pi}{2}, \pi]$
$csc^{-1}(x)$	$(-\infty, -1] \cup [1, \infty)$	$[-\frac{\pi}{2}, 0) \cup (0, \frac{\pi}{2}]$

We can now define the inverse functions more clearly. For the *arcsin* function we define

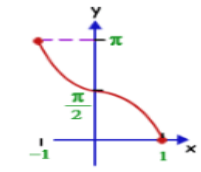
$$y = sin^{-1}(x) \text{ if } -1 \le x \le 1, \ y \text{ is in } [\tfrac{-\pi}{2}, \tfrac{\pi}{2}], \text{ and } sin(y) = x$$

Given below are the graphs of inverse trigonometric functions:



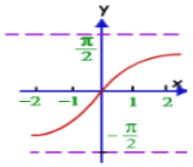
Domain : $-1 \le x \le 1$

Range : $-\frac{\pi}{2} \le y \le \frac{\pi}{2}$



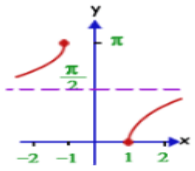
Domain : $-1 \le x \le 1$

Range : $0 \le y \le \pi$



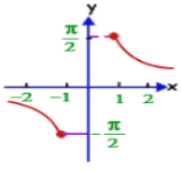
Domain : $-\infty < x < \infty$

Range : $-\frac{\pi}{2} < y < \frac{\pi}{2}$



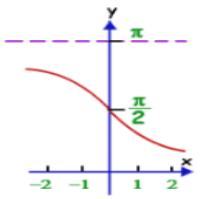
Domain : $x \le -1$ or $x \ge 1$

Range : $0 \le y \le \pi, \ y \ne \frac{\pi}{2}$



Domain : $x \le -1$ or $x \ge 1$

Range : $-\frac{\pi}{2} \le y \le \frac{\pi}{2}, y \ne 0$



Range : $0 < y < \pi$

Domain : $-\infty < x < \infty$