Inverse Trigonometric Functions

Name ______________________

Date ____________ Period ______

Inverse Trig Function		Trig Function
$y = \arcsin x$	if and only if	$\sin y = x$
Output: angle Input: ratio		Input: angle Output: ratio

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

All trig functions are periodic and, thus, not one-to-one.
Therefore, to have an inverse, we must restrict the domain of each trig function.

Inverse Trig Function	Domain: ratio	Range: angle
$y = \arcsin x$	$-1 \leq x \leq 1$	$-\frac{\pi}{2} \leq y \leq \frac{\pi}{2}$
$y = \arccos x$	$-1 \leq x \leq 1$	$0 \leq y \leq \pi$
$y = \arctan x$	$-\infty \leq x \leq \infty$	$-\frac{\pi}{2} < y < \frac{\pi}{2}$
$y = \operatorname{arccot} x$	$-\infty \leq x \leq \infty$	$0 < y < \pi$
$y = \operatorname{arcsec} x$	$\lvert x \rvert \geq 1$	$0 \leq y \leq \pi \quad y \neq \frac{\pi}{2}$
$y = \operatorname{arccsc} x$	$\lvert x \rvert \geq 1$	$-\frac{\pi}{2} < y < \frac{\pi}{2} \quad y \neq 0$

Evaluate the following

$$\arccos \frac{\sqrt{3}}{2}$$

$$\arcsin \frac{\sqrt{2}}{2}$$

Evaluate the following

$$\arccos 0$$

$$\arctan -\sqrt{3}$$

Properties of Inverse Trig Function

Given the inverse trig function is restricted to its domain…

$\sin(\arcsin x) = x$ $\quad\quad$ $\arcsin(\sin x) = x$

$\cos(\arccos x) = x$ $\quad\quad$ $\arccos(\cos x) = x$

$\tan(\arctan x) = x$ $\quad\quad$ $\arctan(\tan x) = x$

Same is true for other inverse trig functions.

Solve the following equations for x.

$\arccos(2x - 1) = 0$ $\quad\quad$ $\arcsin(x^2) = \dfrac{\pi}{2}$

Solve the following equations for x.

$\cos\left(\arcsin \frac{4}{5}\right)$

$\sin\left(\arccos x\right)$