REVIEW: Inverse Trig Functions you should know from Math 7A (7.1, 7.2)

THE DEFINITIONS OF THE INVERSE SINE, COSINE, TANGENT FUNCTIONS:

Since sine, cosine and tangent are not one-to-one functions, they do not have inverse functions. However, if we restrict to domain to a portion of each function which IS one to one, then the restricted function will have an inverse. The key to understanding the inverse functions is to know these restrictions and how to use them.

$y = \sin^{-1} x$ *means* $\begin{cases} \sin y = x \\ AND \\ -\frac{\pi}{2} \le y \le \frac{\pi}{2} \end{cases}$ Note: for x in [-1,1], $\sin^{-1} x$ yields ONE output and it will be in $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$

$y = \cos^{-1} x$ *means* $\begin{cases} \cos y = x \\ AND \\ 0 \le y \le \pi \end{cases}$ Note: for x in [-1,1], $\cos^{-1} x$ yields ONE output and it will be in $[0, \pi]$

$y = \tan^{-1} x$ *means* $\begin{cases} \tan y = x \\ AND \\ -\frac{\pi}{2} < y < \frac{\pi}{2} \end{cases}$ Note: for all x, $\tan^{-1} x$ yields ONE output and it will be in $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$

Finding Inverse Trig Values Exactly (Unless we are doing an application where we are trying to find the measure of an angle in degrees, it is expected that the output of an inverse trig function is in radians).

(a) $\cos^{-1}\left(\frac{1}{2}\right)$=_____

(b) $\sin^{-1}\left(-\frac{1}{2}\right)$= _____

(c) $\cos^{-1}\left(\frac{-\sqrt{3}}{2}\right)$ = _____

(d) $\cos^{-1}(0)$= _____

(e) $\tan^{-1}(0)$=_____

(f) $\sin^{-1}\left(\frac{\sqrt{2}}{2}\right)$= _____

(g) $\cos^{-1}(2)$=_____

(h) $\tan^{-1}\left(\sqrt{3}\right)$= _____

(i) $\tan^{-1}(-1)$=_____

(j) $\sin^{-1}\left(-\frac{\sqrt{3}}{2}\right)$= _____

Watch those restrictions!

We know $\left(f^{-1} \circ f\right)(x) = x$ for every x in the domain of f, and $\left(f \circ f^{-1}\right)(x) = x$ for every x in the domain of f^{-1}.

So why doesn't $\sin^{-1}(\sin\left(\frac{5\pi}{6}\right)) = \frac{5\pi}{6}$? _____

Are $\sin\theta = \frac{1}{2}$ and $\theta = \sin^{-1}\left(\frac{1}{2}\right)$ equivalent? _____

Since $\tan\left(\frac{7\pi}{4}\right) = -1$ then is $\tan^{-1}(-1) = \frac{7\pi}{4}$? _____

What quadrant is it implied that the terminal side of θ is in?

a) $\theta = \sin^{-1}\left(\frac{1}{3}\right)$ _____

c) $\theta = \tan^{-1}(7)$ _____

e) $\theta = \tan^{-1}\left(-\frac{1}{3}\right)$_____

b) $\theta = \cos^{-1}(-0.2)$_____

d) $\theta = \sin^{-1}(-0.4)$_____

f) $\theta = \cos^{-1}\left(\frac{3}{5}\right)$_____

Composition of trig and inverse trig functions. Find exactly.

a) $\sin\left(\cos^{-1}\left(\frac{-1}{3}\right)\right)$= _____

b) $\cos\left(\tan^{-1}(4)\right)$= _____

c) $\tan\left(\sin^{-1}\left(\frac{-1}{5}\right)\right)$= _____

d) $\sin\left(\tan^{-1}\left(\frac{-3}{4}\right)\right)$= _____