PreCalculus Name: Period: Date:

Warm Up 3/10

Lesson 7-4: Inverse Trigonometric Functions

Objectives
Students will…
- Be able to explain what the inverse sine, cosine, and tangent functions do.
- Be able to evaluate angle measurement using the inverse trig functions.

Inverse Functions
We have dealt with inverse functions before when learning about the polynomial functions. As it was for the polynomial functions, there exists an inverse function for the trig functions as well. The core meaning behind these functions hasn't changed: Inverse functions, "undo" their original function. In other words…

For an ________________________ function f, if $f(x) = y$, then $f^{-1}(y) = x$.

Here, we see that to "undo" the function f (or solve for x), we simply take the inverse function f^{-1} to "both" sides.

One-to-One
Moreover, we have also learned that only **one-to-one** functions can have an inverse function, which means that for every output, there is exactly only _______ input. This is CLEARLY not the case for trig functions. Just think back to the unit circle! Values like $\frac{\sqrt{2}}{2}$ happen twice for both sine and cosine functions. Thus, trig functions do **not** have an inverse function as a whole. HOWEVER, we can simply restrict the functions to a certain quadrant, and use the inverse relationship.

Note: This is exactly why we get an answer when we use the inverse trig function on our calculators. They are programmed to restrict the functions to only _______ quadrants.

Example

Find the exact value of the expression. For sine, limit the function to Quadrants II, III and for cosine, limit the function to Quadrants I, II

1. $\sin^{-1}\frac{\sqrt{3}}{2}$ 2. $\cos^{-1}\frac{\sqrt{3}}{2}$ 3. $\cos\left(-\frac{\sqrt{3}}{2}\right)$

Find the exact value of the expression if it is defined.

$\cos\left(\cos^{-1}\frac{2}{3}\right)$ $\tan^{-1}\left(\tan\frac{\pi}{6}\right)$ $\tan\left(\sin^{-1}\frac{\sqrt{2}}{2}\right)$ $\cos^{-1}\left(\sqrt{3}\sin\frac{\pi}{6}\right)$

Homework 3/10
TB pg. 557 #1, 3, 6, 9-12, 13, 15, 19, 23, 25, 26, 27