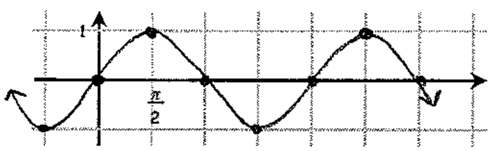
Precalculus Name Key

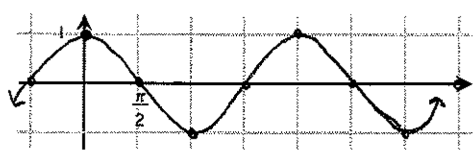
4.7 Notes: Inverse Trigonometric Functions-*Day 2*

__Warm-up__: Graph at least one period of all 6 trigonometric functions.

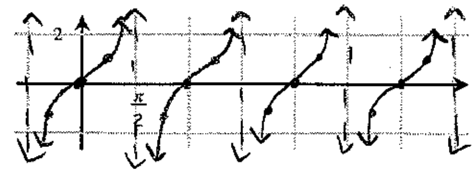
SINE



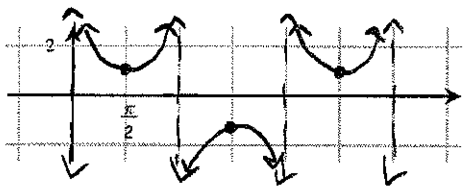
COSINE



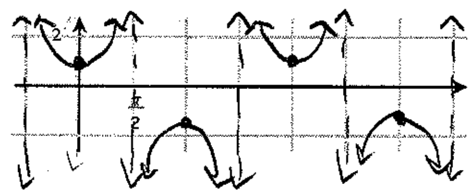
TANGENT



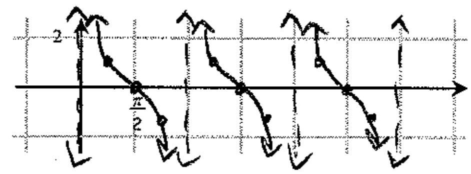
COSECANT



SECANT



COTANGENT



Composition of Trigonometric Functions

Review of inverse functions—If two functions are inverses and you compose them, you get the identity function...or x.

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

Apply that same thought to trigonometric functions and their inverses:

$\sin(\arcsin x) =$ __X__	$\arccos(\cos A) =$ __A__	$\tan(\tan^{-1} 0.78) =$ __0.78__

Review: List the restricted domains and the ranges for each of the following trigonometric functions. See if you can do it without looking anything up!

Sine	Cosine	Tangent
D: $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$ Quad I + IV	D: $[0, \pi]$ Quad I + II	D: $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$ Quad I, IV
R: $[-1, 1]$	R: $[-1, 1]$	R: $(-\infty, \infty)$

Examples: If possible, find the exact value. Be sure to consider the domain and range when you are figuring your answer.

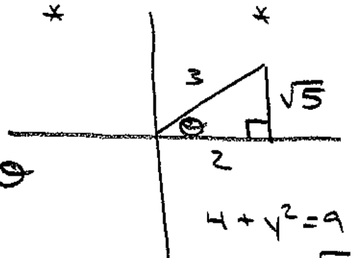
1. $\tan^{-1}\left(\sin\frac{\pi}{2}\right)$ $\sin\frac{\pi}{2} = 1$ $\tan^{-1}(1)$ $\frac{\pi}{4}$	**2.** $\arcsin\left(\sin\frac{5\pi}{3}\right)$ $\sin\frac{5\pi}{3} = -\frac{\sqrt{3}}{2}$ $\arcsin\left(-\frac{\sqrt{3}}{2}\right)$ $-\frac{\pi}{3}$	**3.** $\cos(\cos^{-1}\pi)$ $\cos^{-1}\pi = \theta$ undefined * Not in the domain of $\cos^{-1}$ or range of cos

4. $\cos\left(\arctan\sqrt{3} - \sin^{-1}\left(\frac{\sqrt{3}}{2}\right)\right)$ $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$ $\quad\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$ $\tan\theta = \sqrt{3}$ $\quad \sin\theta = \frac{\sqrt{3}}{2}$ $\theta = \frac{\pi}{3}$ $\quad \theta = \frac{\pi}{3}$ $\cos\left(\frac{\pi}{3} - \frac{\pi}{3}\right)$ $\cos(0)$ 1	**5.** $\sin\left[\frac{\pi}{2} - \cos^{-1}\left(-\frac{1}{2}\right)\right]$ * Range $\cos^{-1}$ $[0, \pi]$ $\cos\theta = -\frac{1}{2}$ $\theta = \frac{2\pi}{3}$ $\sin\left[\frac{\pi}{2} - \frac{2\pi}{3}\right]$ $\sin\left[\frac{3\pi}{6} - \frac{4\pi}{6}\right]$ $\sin\left[-\frac{\pi}{6}\right]$ $-\frac{1}{2}$

Evaluating Composition of Functions:

- *Consider quadrant & draw a triangle.*
- *Find the missing side & solve.*

1. $\tan\left(\arccos\frac{2}{3}\right)$



$\arccos\frac{2}{3} = \theta$

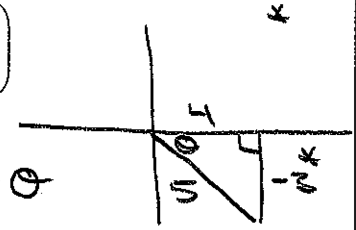
$\cos\theta = \frac{2}{3}$

$\tan\theta = \frac{\sqrt{5}}{2}$

$4 + y^2 = 9$

$y = \sqrt{5}$

2. $\cos\left(\arcsin\left(-\frac{3}{5}\right)\right)$



$\arcsin\left(-\frac{3}{5}\right) = \theta$

$\sin\theta = \frac{-3}{5}$

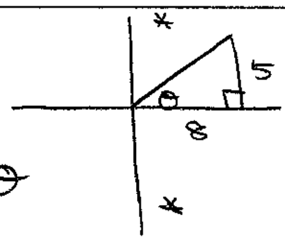
$\cos\theta = \frac{4}{5}$

$x^2 + 9 = 25$

$x^2 = 16$

$x = 4$

3. $\cot\left(\arctan\frac{5}{8}\right)$

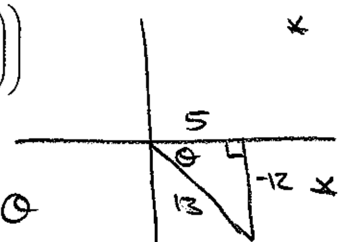


$\arctan\frac{5}{8} = \theta$

$\tan\theta = \frac{5}{8}$

$\cot\theta = \frac{8}{5}$

4. $\csc\left(\arctan\left(-\frac{12}{5}\right)\right)$



$\arctan\left(\frac{-12}{5}\right) = \theta$

$\tan\theta = \frac{-12}{5}$

$c^2 = 25 + 144$

$c^2 = 169$

$c = 13$

$\csc\theta = \frac{1}{\sin\theta}$

$= \frac{1}{\frac{-12}{13}}$

$= -\frac{13}{12}$