## Precal

Name:

## (5.3)Notes----Fundamental Identities

Statements like "tan  $\theta = \sin \theta / \cos \theta$ " and "csc  $\theta = 1/\sin$ " are trigonometric identities because they are true for all values of the variable for which both sides of the equation are defined. The set of all such values is called the "domain of validity" of the identity.

Basic Trigonometric Identities	Pythagorean Identities
$\csc \theta = \frac{1}{\sin \theta} \qquad \sec \theta = \frac{1}{\cos \theta} \qquad \cot \theta = \frac{1}{\sin \theta}$ $\sin \theta = \frac{1}{\csc \theta} \qquad \cos \theta = \frac{1}{\sec \theta} \qquad \tan \theta = \frac{1}{\sin \theta}$ $\tan \theta = \frac{\sin \theta}{\cos \theta} \qquad \cot \theta = \frac{\cos \theta}{\sin \theta}$	$= \frac{1}{\tan \theta}$ $= \frac{1}{\cot \theta}$ $\cos^{2} \theta + \sin^{2} \theta = 1$ $1 + \tan^{2} \theta = \sec^{2} \theta$ $\cot^{2} \theta + 1 = \csc^{2} \theta$
<b>Cofunction Identities</b>	<b>Odd-Even Identities</b>
$\sin\left(\frac{\pi}{2}-\theta\right) = \cos\theta \qquad \cos\left(\frac{\pi}{2}-\theta\right) = \sin\theta$	$ \tan\left(\frac{\pi}{2} - \theta\right) = \cot\theta $ $ \sin(-x) = -\sin x $ $ \csc(-x) = -\csc x $
$\csc\left(\frac{\pi}{2}-\theta\right) = \sec\theta \qquad \sec\left(\frac{\pi}{2}-\theta\right) = \csc\theta$	$\cot\left(\frac{\pi}{2} - \theta\right) = \tan\theta$ $\cos(-x) = \cos x \qquad \sec(-x) = \sec x$ $\tan(-x) = -\tan x \qquad \cot(-x) = -\cot x$

**EXAMPLE 1** -- Find sin  $\theta \& \cos \theta$  given that  $\tan \theta = 5$  and  $\cos \theta > 0$ .

**EXAMPLE 2** – If  $\cos \theta = 0.34$ , find  $\sin (\theta - \pi/2)$ 

**EXAMPLE 3** –Simplify the expression  $\sin^3 x + \sin x \cos^2 x$ .

**EXAMPLE 4** –Simplify the expression  $[(\sec x + 1)(\sec x - 1)] / \sin^2 x.$  **EXAMPLE 5** – Simplify the expression

**EXAMPLE 7** – Factor:  $2\sin^2 x + \sin x - 1$ .

 $\frac{\cos x}{1-\sin x} - \frac{\sin x}{\cos x}$ 

## Practice ----Basic Trigonometric Identities

Simplify – (This means write using as little ink/lead as possible <sup>(2)</sup> )						
1)	sinx cscx cotx	2)	SINX CSCX SECX	3)	cosx (1+tan <sup>2</sup> x)	
4)	cosx secx - cos <sup>2</sup> x	5)	cos <sup>2</sup> x cscx secx	6)	$\underline{\operatorname{csc} x}$	
					$\cot x$	

**Verify -** (This means you can choose EITHER the left or right side to simplify to look like the other side...you CANNOT WORK ON BOTH RIGHT & LEFT) \*\*\*\*It is usually easier to work on the more complex side\*\*\*\*

7)  $\sec x \csc x = \frac{\sec^2 x}{\tan x}$  8)  $\frac{\tan x}{1 - \cos^2 x} = \csc x \sec x$