

Trig Identities 7.1 Review

Acc Pre-Calculus

Name: _____

Per: _____

Simplify each expression.

1. $\cos x (\sec x - \cos x)$

$$\cancel{\cos x} \cdot \frac{1}{\cancel{\cos x}} - \cos^2 x = 1 - \cos^2 x = \boxed{\sin^2 x}$$

2. $\frac{\tan y + \cot y}{\sec^2 y}$

$$\frac{\frac{\sin y}{\cos y} + \frac{\cos y}{\sin y}}{\frac{1}{\cos^2 y}} = \left(\frac{\sin y}{\cos y} + \frac{\cos y}{\sin y} \right) \cdot \frac{\cos^2 y}{1}$$

$$\boxed{\cot y} = \frac{\cos y}{\sin y} = \frac{\cancel{\sin^2 y} + \cancel{\cos^2 y}}{\cancel{\cos y} \sin y} \cdot \cos^2 y$$

3. $(\sec x + \tan x)(1 - \sin x)$

$$\frac{1}{\cos} + \frac{\sin}{\cos} \Rightarrow \left(\frac{1 + \sin x}{\cos x} \right) \left(\frac{1 - \sin x}{1} \right)$$

$$\frac{1 - \sin^2 x}{\cos x} = \frac{\cos^2 x}{\cos x} = \boxed{\cos x}$$

4. $\frac{\tan t}{\sec t + 1}$ *little tricky*

$$\frac{\frac{\sin t}{\cos t}}{\frac{1}{\cos t} + \frac{\cos t}{\cos t}} = \frac{\frac{\sin t}{\cos t} \left(\frac{1 - \cos t}{1 - \cos t} \right)}{\frac{\sin t (1 - \cos t)}{\sin^2 t} = \frac{\sin t (1 - \cos t)}{1 - \cos^2 t} = \frac{1 - \cos t}{\sin t} = \boxed{\csc t - \cot t}$$

5. Verify $\frac{\csc x}{\cot x + \tan x} = \cos x$

$$\frac{\frac{1}{\sin x}}{\frac{\cos x}{\sin x} + \frac{\sin x}{\cos x}} = \frac{\frac{1}{\sin x}}{\frac{\cos^2 x + \sin^2 x}{\cos x \sin x}} = \frac{1}{\sin x} \cdot \frac{\cos x \sin x}{1} = \boxed{\cos x}$$

6. Verify $(1 - \sin^2 x)(1 + \tan^2 x) = 1$

$$\cancel{\cos^2 x} \cdot \sec^2 x = \cancel{\cos^2 x} \cdot \frac{1}{\cancel{\cos^2 x}} = \boxed{1}$$

7. Verify $\tan x + \cot x = \sec x \csc x$

$$\frac{\sin x}{\cos x} + \frac{\cos x}{\sin x} = \frac{\sin^2 x + \cos^2 x}{\cos x \sin x} = \frac{1}{\cos x \sin x} = \boxed{\sec x \csc x}$$

8. Verify $\frac{1 + \tan x}{1 + \cot x} = \tan x$

$$\frac{1 + \frac{\sin x}{\cos x}}{1 + \frac{\cos x}{\sin x}} = \frac{\frac{\cos x + \sin x}{\cos x}}{\frac{\sin x + \cos x}{\sin x}} = \frac{\cancel{\cos x + \sin x}}{\cos x} \cdot \frac{\sin x}{\cancel{\sin x + \cos x}} = \frac{\sin x}{\cos x} = \boxed{\tan x}$$

9. Verify $\csc^2 x \tan^2 x - 1 = \tan^2 x$

$$\begin{aligned}
 &= \frac{1}{\cancel{\sin^2 x}} \cdot \frac{\cancel{\sin^2 x}}{\cos^2 x} \\
 &= \frac{1}{\cos^2 x} - 1 \\
 &= \sec^2 x - 1 \\
 &= \boxed{\tan^2 x}
 \end{aligned}$$

10. Verify $\frac{\sec^2 y}{\sec^2 y - 1} = \csc^2 y$

$$\begin{aligned}
 &= \frac{1}{\cos^2 y} \cdot \frac{1}{\tan^2 y} \\
 &= \frac{1}{\cancel{\cos^2 y}} \cdot \frac{\cancel{\cos^2 y}}{\sin^2 y} \\
 &= \frac{1}{\sin^2 y} \\
 &= \boxed{\csc^2 y}
 \end{aligned}$$

11. Verify $\cos^2 x - \sin^2 x = 1 - 2\sin^2 x$

#10 $1 - \sin^2 - \sin^2 x$

$$\boxed{1 - 2\sin^2 x} \quad \checkmark$$

12. Verify $\frac{\sec \theta}{\cos \theta} - \frac{\tan \theta}{\cot \theta} = 1$

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

$$\frac{1}{\cos \theta} \cdot \frac{1}{\cos \theta} - \frac{\sin \theta}{\cos \theta} \cdot \frac{\sin \theta}{\cos \theta}$$

$$\frac{1}{\cos^2 \theta} - \frac{\sin^2 \theta}{\cos^2 \theta}$$

$$\frac{1 - \sin^2 \theta}{\cos^2 \theta} = \frac{\cos^2 \theta}{\cos^2 \theta} = 1 \quad \checkmark$$