

Assignment 9A.1: Intro. To Trig. Identities

Simplify each expression using the trigonometric identities and substitution. Show your steps

1. $\cos x \cdot \tan x$

$$\begin{aligned}\cos x \tan x &= \cos x \cdot \frac{\sin x}{\cos x} \\ &= \sin(x)\end{aligned}$$

2. $\cos x \cdot \csc x$

$$\begin{aligned}\cos x \csc x &= \cos x \left(\frac{1}{\sin x} \right) \\ &= \cot(x)\end{aligned}$$

3. $\csc x - \csc x \cdot \cos^2 x$

$$\begin{aligned}&= \csc(x) (1 - \cos^2 x) \\ &= \csc x \cdot \sin^2 x \\ &= \frac{1}{\sin x} \cdot \sin^2 x \\ &= \sin x\end{aligned}$$

4. $\frac{1 - \cos^2 x}{\sin x}$

$$\frac{\sin^2 x}{\sin x} = \sin x$$

5. $\frac{\sin^2 x + \tan^2 x + \cos^2 x}{\sec x}$

$$\begin{aligned}\frac{1 + \tan^2 x}{\sec x} &= \frac{\sec^2 x}{\sec x} \\ &= \sec(x)\end{aligned}$$

6. $\sin x + \sin x \tan^2 x$ (Try factoring)

$$\sin x (1 + \tan^2 x)$$

$$\sin x \cdot \sec^2 x$$

$$\sec(x) \tan(x)$$

7. $\frac{\sec^2 x - \tan^2 x}{\cos^2 x + \sin^2 x}$

$$\frac{(1 + \tan^2 x) - \tan^2 x}{1} = \frac{1}{1} = 1$$

8. (Hint: Write in terms of sine and cosine. Then make a compound fraction)

$$\frac{1 + \tan x}{1 + \cot x}$$

$$\begin{aligned}\frac{1 + \tan x}{1 + \cot x} &= \frac{1 + \frac{\sin x}{\cos x}}{1 + \frac{\cos x}{\sin x}} \\ &= \frac{\frac{\cos x + \sin x}{\cos x}}{\frac{\sin x + \cos x}{\sin x}} \\ &= \frac{\sin x}{\cos x + \sin x} \cdot \frac{\sin x}{\sin x + \cos x} \\ &= \frac{\sin x}{\cos x} \\ &= \tan(x)\end{aligned}$$