

Honors Algebra II/Trig  
14.2 Worksheet

Name: Key

Prove each of the following trig identities.

1.  $\cos^2 x + (\tan^2 x)(\cos^2 x) = 1$

$$\cos^2 x (1 + \tan^2 x) = 1$$

$$\cos^2 x \cdot \sec^2 x = 1$$

$$1 = 1 \checkmark$$

3.  $\frac{1}{\sec^2 x} + \frac{1}{\csc^2 x} = 1$

$$\cos^2 x + \sin^2 x = 1$$

$$1 = 1 \checkmark$$

5.  $\frac{\cos x}{\sec x - 1} - \frac{\cos x}{\tan^2 x} = \cot^2 x$

$$\frac{(\sec x + 1) \cos x}{(\sec x + 1)(\sec x - 1)} - \frac{\cos x}{\sec^2 x - 1} = \cot^2 x$$

$$\frac{1 + \cos x - \cos x}{\sec^2 x - 1} = \cot^2 x$$

$$\frac{1}{\tan^2 x} = \cot^2 x$$

$$\cot^2 x = \cot^2 x \checkmark$$

2.  $\frac{1}{\sin x \cos x} - \frac{\cos x}{\sin x} = \tan x$

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

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

$$\frac{\sin x}{\cos x} =$$

$$\tan x = \tan x \checkmark$$

4.  $\frac{1}{1 + \cos x} = \csc^2 x - \csc x \cot x$

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

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

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

$$\csc^2 x - \csc x \cot x = \csc^2 x - \csc x \cot x \checkmark$$

6.  $\frac{(\sin x) \sin x}{(\sin x)(1 - \cos x)} + \frac{(1 - \cos x)^{(1 - \cos x)}}{\sin x (1 - \cos x)} = 2 \csc x$

$$\frac{\sin^2 x + 1 - 2\cos x + \cos^2 x}{\sin x (1 - \cos x)}$$

$$\frac{2 - 2\cos x}{\sin x (1 - \cos x)}$$

$$\frac{2(1 - \cos x)}{\sin x (1 - \cos x)}$$

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

$$2 \csc x = 2 \csc x \checkmark$$

$$7. \sin^3 x \cos^2 x = \cos^2 x \sin x - \cos^4 x \sin x$$

$$\sin x (\sin^2 x) (\cos^2 x) =$$

$$\sin x (1 - \cos^2 x) (\cos^2 x) =$$

$$\cos^2 x \sin x - \cos^4 x \sin x = \cos^2 x \sin x - \cos^4 x \sin x -$$

$$8. \sec^2 x + \csc^2 x = \sec^2 x \csc^2 x$$

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

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

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

$$\sec^2 x \csc^2 x = \sec^2 x \csc^2 x \checkmark$$

$$9. \sec x + \tan x = \frac{1}{\sec x - \tan x} \frac{(\sec x + \tan x)}{(\sec x + \tan x)}$$

$$\sec x + \tan x = \frac{\sec x + \tan x}{\sec^2 x - \tan^2 x}$$

$$\sec x + \tan x = \sec x + \tan x \checkmark$$

$$\text{OR } \frac{\sec x - \tan x}{\sec x - \tan x} \cdot \sec x + \tan x = \frac{1}{\sec x - \tan x}$$

$$\frac{\sec^2 x - \tan^2 x}{\sec x - \tan x}$$

$$\frac{1}{\sec x - \tan x} = \frac{1}{\sec x - \tan x}$$