

## Notes Section 5.2 - Verifying Trig Identities

Verify,

$$1. \frac{\tan^2 x + 1}{1 - \sin^2 x} = \sec^4 x$$

$$\bullet \frac{\sec^2 x}{\cos^2 x} = \sec^4 x$$

$$\bullet \sqrt{\cos^2 x} \cdot \sqrt{\cos^2 x} = \sec^4 x$$

$$\bullet \sqrt{\cos^4 x} = \sec^4 x$$

$$\bullet \sec^4 x = \sec^4 x$$

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

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

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

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

$$\bullet -2 \cot x = \frac{-2 \cancel{\sin x} \cos x}{\sin^2 x}$$

$$\bullet -2 \cot x = \frac{-2 \cos x}{\sin x}$$

$$\bullet -2 \cot x = -2 \cot x$$

$$3. \frac{\sin x}{\sec x - 1} = \cos x \cot x + \cot x$$

$$\bullet \frac{\sin x}{\sec x - 1} \cdot \frac{\sec x + 1}{\sec x + 1} = \cos x \cot x + \cot x$$

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

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

$$\bullet \frac{\cos^2 x}{\sin^2 x} \cdot \cancel{\sin x} (\sec x + 1) = \cos x \cot x + \cot x$$

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

$$\bullet \frac{\cos^2 x}{\sin x} \cdot \sec x + \frac{\cos^2 x}{\sin x} = \cos x \cot x + \cot x$$

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

$$\bullet \frac{\cos x}{\sin x} + \frac{\cos x \cos x}{\sin x} = \cos x \cot x + \cot x$$

$$\bullet \cot x + \cos x \cot x = \cos x \cot x + \cot x$$

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

$$\bullet \cos x \tan x (\sec^2 x - \tan^2 x) = \sin x$$

$$\bullet \cos x \tan x = \sin x$$

$$\bullet \cancel{\cos x} \cdot \frac{\sin x}{\cancel{\cos x}} = \sin x$$

$$\bullet \sin x = \sin x$$

$$5. \cot^3 x + \cot x = \cos x \csc^3 x$$

$$\bullet \cot x (\cot^2 x + 1) = \cos x \csc^3 x$$

$$\bullet \cot x (\csc^2 x) = \cos x \csc^3 x$$

$$\bullet \frac{\cos x}{1} \cdot \frac{1}{\sin x} (\csc^2 x) = \cos x \csc^3 x$$

$$\bullet \cos x \cdot \csc x (\csc^2 x) = \cos x \csc^3 x$$

$$\bullet \cos x \csc^3 x = \cos x \csc^3 x$$