

Section 5.1 & 5.2

Using Trigonometric Identities

Part 3

Objective: Given an **equation** students will be able to prove/verify the equation is true by using the fundamental trig identities.

Study problems

Trigonometric II part 3 wks

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

$$\sin^2 x = 1 - \cos^2 x \quad \cos^2 x = 1 - \sin^2 x$$

$$-\sin^2 x = \cos^2 x - 1 \quad -\cos^2 x = \sin^2 x - 1$$

$$\tan^2 x + 1 = \sec^2 x$$

$$\tan^2 x = \sec^2 x - 1$$

$$-\tan^2 x = 1 - \sec^2 x$$

$$\cot^2 x + 1 = \csc^2 x$$

$$\cot^2 x = \csc^2 x - 1$$

$$-\cot^2 x = 1 - \csc^2 x$$

Example

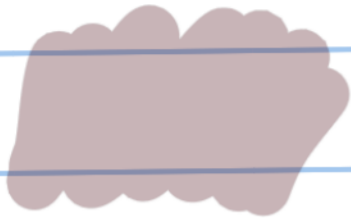
Use the trig identities to transform one side of the equation into the other.

$$\frac{\tan^2 x + 1}{\csc^2 x - 1} = \underline{\sec^2 x} \tan^2 x$$

$$\frac{\sec^2 x}{\frac{\cot^2 x}{1}} \Rightarrow \sec^2 x \cdot \frac{1}{\cot^2 x}$$
$$\sec^2 x \tan^2 x$$

Example

Use the trig id



$$1 - \cancel{\cos^2 x} \left(\frac{\sin^2 x}{\cancel{\cos^2 x}} \right)$$

$$1 - \sin^2 x$$

$$\cos^2 x$$

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

Use the fundamental trig to prove the equation.

$$\frac{(1 + \sin \theta)}{(1 + \sin \theta)} \frac{1}{1 - \sin \theta} + \frac{1}{1 + \sin \theta} \frac{(1 - \sin \theta)}{(1 - \sin \theta)} = 2 \sec^2 \theta$$

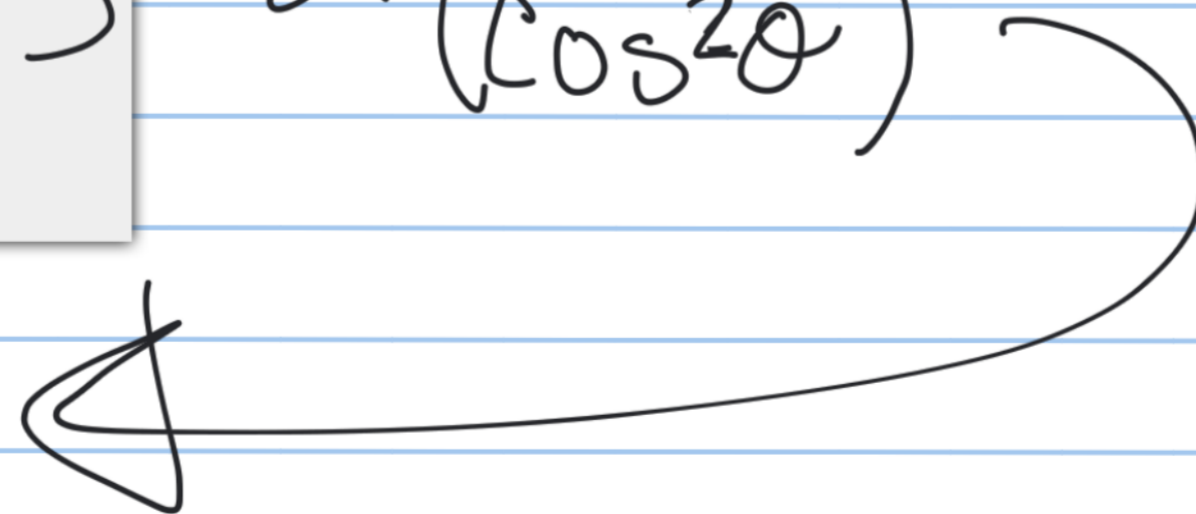
$$(1 + \sin \theta)(1 - \sin \theta)$$

$$1 - \cancel{\sin \theta} + \cancel{\sin \theta} - \sin^2 \theta$$

$$1 - \sin^2 \theta$$

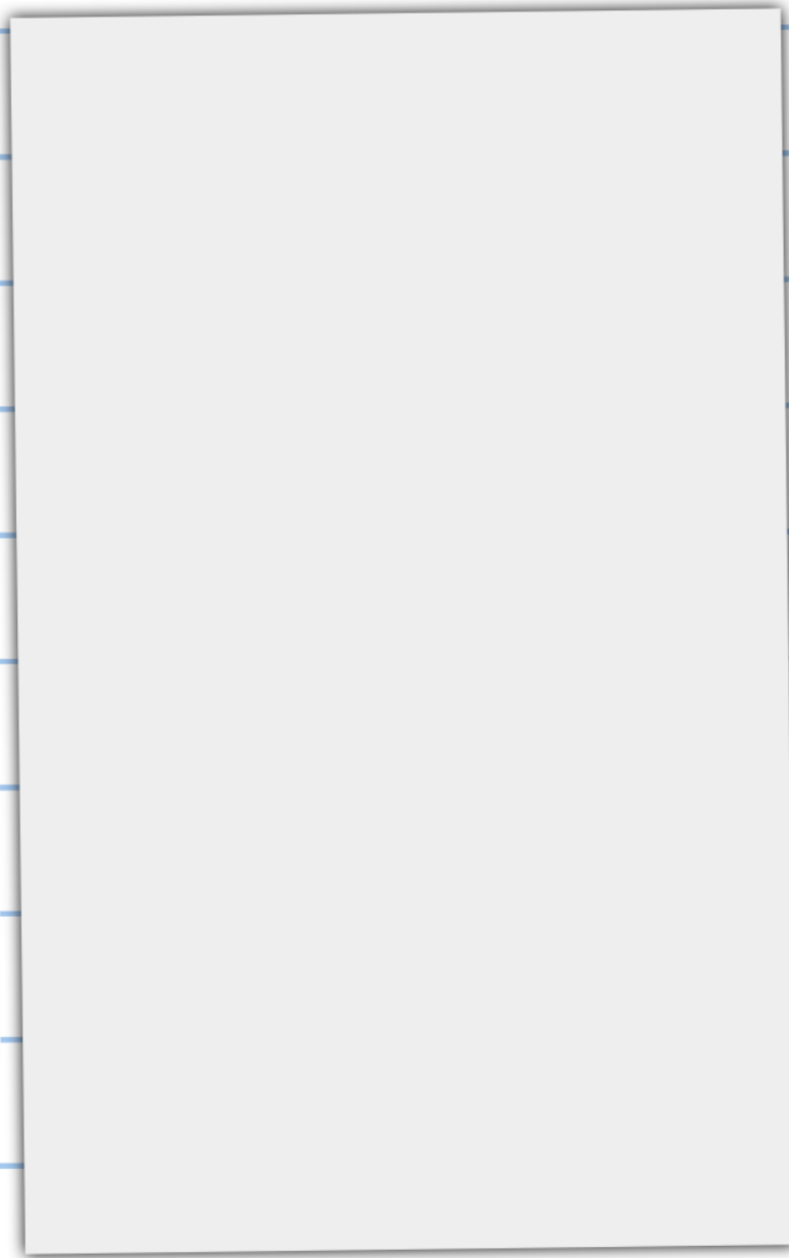
$$\frac{1 + \cancel{\sin \theta} + 1 - \cancel{\sin \theta}}{1 - \sin^2 \theta}$$
$$\frac{2}{1 - \sin^2 \theta}$$
$$\frac{2}{\cos^2 \theta} \rightarrow 2 \left(\frac{1}{\cos^2 \theta} \right)$$

$$2 \sec^2 \theta$$



$$\csc x - \sin x = \cos x \cot x$$

$$\begin{aligned} &= \frac{1}{\sin x} - \sin x \\ &= \frac{1}{\sin x} - \left(\frac{\sin x}{1}\right) \frac{\sin x}{\sin x} \\ &= \frac{1}{\sin x} - \frac{\sin^2 x}{\sin x} \\ &= \frac{1 - \sin^2 x}{\sin x} \\ &= \frac{\cos^2 x}{\sin x} \\ &= \left(\frac{\cos x}{\sin x}\right) \cos x \\ &= \cot x \cos x \end{aligned}$$



Hi!

Example

Use the trig identities to transform one side of the equation into the other.

$$\sec x - \tan x \sin x = \cos x$$

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

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

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

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

$$= \cos x$$

