5.2 Proving Trig Identities

ESSENTIAL QUESTIONS: How do you

1. **determine whether an equation is an identity?**
2. **confirm identities analytically?**

Strategies for Proving Identities

1. Start with the most complicated side of the equation.
2. Simplify using any of our trig identities. Your work should be a neat and logical progression of steps. Because this is a proof, do NOT skip steps!
3. Keep working until you end with the other side of the equation.

examples:

$$(\sin x)(\cot x + \cos x \tan x) = \cos x + \sin^2 x$$

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

$$\tan x + \sec x = \frac{\cos x}{1 - \sin x}$$

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

$$\frac{\sec x + 1}{\tan x} = \frac{\sin x}{1 - \cos x}$$

$$\tan^2 \theta - \sin^2 \theta = \tan^2 \theta \sin^2 \theta$$

$$\frac{\sin t}{1 + \cos t} + \frac{1 + \cos t}{\sin t} = 2 \csc t$$

$$\frac{\sin A \cos B + \cos A \sin B}{\cos A \cos B - \sin A \sin B} = \frac{\tan A + \tan B}{1 - \tan A \tan B}$$

$$\frac{1 - 3 \cos x - 4 \cos^2 x}{\sin^2 x} = \frac{1 - 4 \cos x}{1 - \cos x}$$

$$\sec^4 x = (1 + \tan^2 x)(\sec^2 x)$$