5.2 Verifying Trig Identities

Conditional Equation - true for only some of the values in its domain

ie.) $\sin x = 0$

Identity - true for all real values in the domain

ie.) $\sin^2 x = 1 - \cos^2 x$

Guidelines for Verifying Trig Identities

1. **Work on one side of the equation at a time (try more complicated side first)**
2. **Look for opportunities to factor, add, square a binomial, create a monomial denominator**
3. **Look for opportunities to use fundamental identities**
4. **If none of the above work, try converting all terms to sines & cosines**
5. **Try SOMETHING - even if you get to a dead end, you now know what doesn't work!**

Verifying means proving -
therefore, you cannot assume that both sides are equal
and you cannot move terms across the equal sign

Example 1 - Verifying a Trig Identity

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

Example 2 - Combining Fractions Before Using Identities

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

Example 3 - Verifying a Trig Identity

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

Example 4 - Converting to Sines & Cosines

$$\tan x + \cot x = \sec x \csc x$$

Example 5 - Verifying a Trig Identity

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

Example 6 - Working with Each Side Separately

$$\frac{\cot^2 x}{1 + \csc x} = \frac{1 - \sin x}{\sin x}$$

Example 7 - Examples from Calculus

a.) $\tan^4 x = \tan^2 x \sec^2 x - \tan^2 x$

b.) $\sin^3 x \cos^4 x = (\cos^4 x - \cos^6 x) \sin x$