

**Notes (5.4) – Proving Trig Identities**

Proving identities is all about SHOWING YOUR WORK!!!

With an identity, you begin by writing down *one function* and end by writing down *the other*.

Hints:

- 1) Start with the more complicated side.
  - 2) Only work one side!
  - 3) Know your trig identities
  - 4) Change terms to  $\sin \theta$  and  $\cos \theta$
  - 5) Use Algebra
    - combine/separate fractions
    - Foil/Factor
    - Multiply by 1 (using a conjugate)
  - 6) Keep checking your goal!
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**EXAMPLE 1** Proving an Algebraic Identity

Prove the algebraic identity  $\frac{x^2 - 1}{x - 1} - \frac{x^2 - 1}{x + 1} = 2$ .

**EXAMPLE 2** Proving an Identity

Prove the identity:  $\tan x + \cot x = \sec x \csc x$ .

**EXAMPLE 3** Identifying and Proving an Identity **EXAMPLE 4** Setting up a Difference of Squares

Match the function

$$f(x) = \frac{1}{\sec x - 1} + \frac{1}{\sec x + 1}$$

with one of the following. Then confirm the match with a proof.

(i)  $2 \cot x \csc x$       (ii)  $\frac{1}{\sec x}$

Prove the identity:  $\cos t/(1 - \sin t) = (1 + \sin t)/\cos t$ .

**Example 5** Prove:  $\frac{\tan \theta - \cot \theta}{\tan \theta + \cot \theta} = \sin^2 \theta - \cos^2 \theta$