Verifying Trig Identities: Part 1

Goal: • Can use Pythagorean, Sum/Difference and Double Angle identities fluently to show statements algebraically.
Terminology: • Identity

What makes the following an identity

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

And this just an equation

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

Definition: An identity is different from an equation because

The textbook describes this section as "proofs" but it really should be called good algebra. Proofs are one of the most beautiful things in mathematics and this is unfortunately not it. When you get to university, I strongly suggest you take an introductory proofs class or a class in logic and reasoning.

Example: There are at least two people in Vancouver who were born on the same minute of the same day.

Sadly, we don't get to study this ☹

We do get to talk about forward and backward reasoning though.

Example: Show the following is true:

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

Practice: Show the following is true

$$\sin^2 x - \sec^2 x + \tan^2 x = -\cos^2 x$$

Practice Show the following is true

$$\cot^2 x = \left(\frac{1+\sin x}{\sin x}\right)(\csc x - 1)$$

Practice: Show the following is true

$$\frac{\cos 2x}{\cos x + \sin x} + \sin x = \cos x$$

Practice Show the following is true

$$\sin^2 x + 1 = 3\sin^2 x + \cos 2x$$

Practice: Show the following:

$$\tan x \cdot \sin 2x = 2 - 2\cos^2 x$$

Practice: Show the following is true:

$$\csc x - 2\cot 2x \cdot \cos x = 2\sin x$$

Practice: Show the following is true:

$$(\sin x + \csc x)^2 + (\cos x + \sec x)^2 = 7 + \tan^2 x + \cot^2 x$$

Suggested Practice Problems: 6.3 # 1-8, 10-18
Textbook Reading: page 290-295 and 309-3121; Key Ideas page 313
Next Class: Proving Trig Identities again