

PC Notes Section 5.2

Objectives: Use algebra to verify trig identities

Two functions f and g are said to be **identically equal** if $f(x) = g(x)$.

- Such an equation is referred to as an **identity**.
- To **verify an identity** means to rewrite one side of an equation so that it is identical to the other side.

Strategies for establishing an identity:

- Work with the more complicated side to transform it into the form of the simpler side.
- Some possible strategies include substitution, factoring, multiplication by a conjugate, and finding a common denominator.
- Sometimes rewriting one side in terms of sine and cosine functions only will help.
- Must show all steps – this is a proof.

Identities that can be used can be found on page 340 as well as on your notes sheet from 5.1. Remember that the Pythagorean identities are often used in a different form (i.e., $\sin^2 x = 1 - \cos^2 x$).

Examples:

$$1) \cos\theta \sec\theta - \cos^2\theta = \sin^2\theta$$

$$2) \frac{1 + \csc\theta}{\cot\theta + \cos\theta} = \sec\theta$$

$$3) \frac{\sin\theta + \cos\theta}{\sin\theta} - \frac{\cos\theta - \sin\theta}{\cos\theta} = \sec\theta \csc\theta$$

$$4) \frac{\tan\theta}{1 + \sec\theta} + \frac{1 + \sec\theta}{\tan\theta} = 2 \csc\theta$$

Precalculus

Name _____

Proving Trigonometric Identities

Date _____ Period ____

Prove each identity

1) $(\sec^2 \theta)(1 - \cos^2 \theta) = \tan^2 \theta$

2) $\cos \theta + \sin \theta \tan \theta = \sec \theta$

3) $\frac{1}{1 + \tan^2 \theta} + \frac{1}{1 + \cot^2 \theta} = 1$

4) $(1 - \cos \theta)(\csc \theta + \cot \theta) = \sin \theta$

5) $\frac{\cos \theta}{1 - \sin \theta} - \frac{\cos \theta}{1 + \sin \theta} = 2 \tan \theta$

$$6) \frac{\sec\theta}{\sec\theta - 1} - \frac{\sec\theta + 1}{\tan^2\theta} = 1$$

$$7) \frac{\csc x - 1}{\cot x} + \frac{\cot x}{\csc x + 1} = \frac{2\cos x}{1 + \sin x}$$

$$8) \frac{(\sin x + \cos x)^2}{\sin x} = \csc x + 2\cos x$$

$$9) \frac{1 + \sec\theta}{\tan\theta} + \frac{\tan\theta}{1 + \sec\theta} = 2\csc\theta$$

$$10) (\sec x + \tan x)^2 = \frac{1 + \sin x}{1 - \sin x}$$