Name: _____ Date: _____

4.6 Trigonometric Identities

BLM 4–12

1. Consider the equation $\frac{\cos x \tan x}{\sin x} = 1$.

a) Show that it is true for $x = 30°$.

b) Show that it is true for $x = 45°$.

c) Show that it is true for $x = 60°$.

d) Explain why showing that the equation is true for $x = 30°$, 45°, and 60° is not a proof that the equation is true for all values of x.

2. Prove that the equation in question 1 is always true.

3. Prove that $\frac{1}{\cos x} - \sin x \tan x = \cos x$.

4. Prove that $\tan^2 x - \cos^2 x = \sec^2 x - \cos^2 x - 1$.

5. a) Use a graphing calculator to graph $y = \tan x + \cot x$ for $0° \leq x \leq 360°$.

b) On the same grid of the graphing calculator, graph $y = \sec x \csc x$ for $0° \leq x \leq 360°$.

c) What do you notice about these two graphs for this interval?

d) Does this constitute a proof that the two expressions form an identity? Explain.

6. Show that the two expressions in 5a) and 5b) form an identity.

7. In the proof of $\frac{\cos^2 x}{1 - \sin x} = 1 + \sin x$, Simon simplified as follows:

$$(1 - \sin x) \times \frac{\cos^2 x}{(1 - \sin x)} = (1 + \sin x) \times (1 - \sin x)$$

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

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

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

He knew that this was true because it was the Pythagorean identity. Is his proof valid? Explain why or why not.

8. Prove that $\tan^2 \theta + \cos^2 \theta + \sin^2 \theta = \sec^2 \theta$.

9. Prove each identity.

a) $\sin^2 \theta + 2\cos^2 \theta - 1 = \cos^2 \theta$

b) $\tan^2 x - \sin^2 x = \sin^2 x \tan^2 x$

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

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