

Verifying Trigonometric Identities (5.1)

- Work with each side of the equation independently of the other side. Start with the more complicated side and transform it in a step-by-step fashion until it looks like the other side.
- Analyze the identity and look for opportunities to apply the fundamental identities.
- Try using one or more of the following techniques:
 1. Rewrite the more complicated side in terms of sines and cosines.
 2. Factor out the greatest common factor.
 3. Separate a single-term quotient into two terms:
 4. combine fractional expressions using the least common denominator.
 5. multiply the numerator and the denominator by a binomial factor that appears on the other side of the identity.
- Don't be afraid to stop and start over again if you are not getting anywhere. Creative puzzle solvers know that strategies leading to dead ends often provide good problem-solving ideas.

Simplify by using reciprocal, quotient, Pythagorean or even-odd identities.

$$1) \cot x \cos x \csc(-x) \qquad 2) \frac{\tan x \csc x}{\sec x \cot x}$$

$$3) 1 - \sec^2 x \qquad 4) \cos^2 x - \sin^2 x$$

Simplify by using only sine and cosine. Be sure to add the expressions together.

$$5) \cot x + \tan x \qquad 6) \csc \theta - \sin \theta$$

Simplify by factoring.

$$7) \cos^4 t - \sin^4 t \qquad 8) 2 \sin^2 \alpha - \sin \alpha - 3$$

Simplify by adding or subtracting rational expressions.

9) $\frac{1}{1 + \cos x} + \frac{1}{1 - \cos x}$

10) $\frac{\sin \theta}{\cos \theta + 1} + \frac{\cos \theta - 1}{\sin \theta}$

Simplify by multiplying the numerator and denominator by the conjugate.

11) $\frac{\cos \alpha}{1 + \sin \alpha}$

12) $\frac{1}{\sin t - 1}$

Verifying Trigonometric Identities: Verify each identity.

13) $\cos x \cot x + \sin x = \csc x$

14) $\cos t \cot t = \frac{1 - \sin^2 t}{\sin t}$

$$15) \frac{\cos^2 \theta + 4 \cos \theta + 4}{\cos \theta + 2} = \frac{2 \sec t + 1}{\sec t}$$

$$16) \frac{\sin x}{1 + \cos x} + \frac{1 + \cos x}{\sin x} = 2 \csc x$$

$$17) \frac{\cos x}{1 + \sin x} = \frac{1 - \sin x}{\cos x}$$

$$18) \frac{\sec x + \csc(-x)}{\sec x \csc x} = \sin x - \cos x$$

$$19) \frac{1}{1 + \sin \theta} + \frac{1}{1 - \sin \theta} = 2 \sec^2 \theta$$

$$20) (\cot^2 \beta + 1)(\sin^2 \beta + 1) = \cot^2 \beta + 2$$