

Name: _____

Verifying Trigonometric Identities

Exercise 1: Rewrite the expression so that it is not in fractional form.

1) $\frac{1}{1 + \sin x}$

2) $\frac{\sin^2 x}{1 - \cos x}$

3) $\frac{5}{\tan x + \sec x}$

4) $\frac{\tan^2 x}{\csc x + 1}$

Exercise 2: Perform the indicated addition or subtraction and use the fundamental identities to simplify

1) $\frac{\sin x}{1 + \cos x} + \frac{\cos x}{\sin x}$

2) $\frac{1}{\sec x + 1} - \frac{1}{\sec x - 1}$

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

4) $\frac{\cos x}{1 + \sin x} + \frac{1 + \sin x}{\cos x}$

Exercise 3: Simplify:

1) $\cot \theta \sec \theta$

2) $\cos \theta \tan \theta$

3) $\frac{\csc \theta}{\sec \theta}$

4) $\frac{\cot \theta}{\csc \theta}$

5) $\frac{1 - \sin^2 \theta}{\csc^2 \theta - 1}$

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

7) $\frac{\tan^2 \theta}{\sec^2 \theta}$

8) $\sin t + \cot t \cos t$

9) $\sin \beta \tan \beta + \cos \beta$

10) $\cot \beta \sin \beta + \tan \beta \cos \beta$

11) $\cos \beta (1 + \tan^2 \beta)$

12) $\sec^2 \beta (1 - \sin^2 \beta)$

Exercise 4: Factor each identity:

1) $\sec^4 \theta - \tan^4 \theta$

2) $\sec^2 \theta - 1$

3) $\sin^2 \theta \sec^2 \theta - \sin^2 \theta$

4) $4 \tan^2 \theta + \tan \theta - 3$

5) $\tan^2 \theta - \tan^2 \theta \sin^2 \theta$

6) $\sin^2 \theta \csc^2 \theta - \sin^2 \theta$

7) $1 - 2 \cos^2 \theta + \cos^4 \theta$

8) $\tan^4 \theta + 2 \tan^2 \theta + 1$

9) $\sin^4 \theta - \cos^4 \theta$

10) $\frac{\cos^2 \theta - 4}{\cos \theta - 2}$

Exercise 5: Verify each identity

1) $\cot \theta \cos \theta + \sin \theta = \csc \theta$

2) $\cot \theta \cos \theta = \csc \theta - \sin \theta$

3) $\frac{\cos \theta}{1 - \sin \theta} = \sec \theta + \tan \theta$

4) $\frac{\tan^2 \theta - 1}{1 + \tan^2 \theta} = 1 - 2 \cos^2 \theta$

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

6) $\frac{\cot^2 \theta}{1 + \csc^2 \theta} = \frac{1 - \sin \theta}{\sin \theta}$

7) $\frac{1}{\sec \theta - \tan \theta} = \sec \theta + \tan \theta$

8) $(1 + \cot^2 \theta)(1 - \sin^2 \theta) = \cot^2 \theta$