

**No Joking Around  
Trigonometric Identities**

Establish each identity

1.  $\tan \theta \cot \theta - \cos^2 \theta = \sin^2 \theta$

2.  $(\csc \theta - 1)(\csc \theta + 1) = \cot^2 \theta$

3.  $\tan^2 \theta \cos^2 \theta + \cot^2 \theta \sin^2 \theta = 1$

4.  $(\sin \theta + \cos \theta)^2 + (\sin \theta - \cos \theta)^2 = 2$

5.  $1 - \frac{\sin^2 \theta}{1 + \cos \theta} = \cos \theta$

6.  $\tan \theta + \frac{\cos \theta}{1 + \sin \theta} = \sec \theta$

7.  $\frac{\cos^2 \theta - \sin^2 \theta}{1 - \tan^2 \theta} = \cos^2 \theta$

8.  $\frac{\sin^2 \theta - \tan \theta}{\cos^2 \theta - \cot \theta} = \tan^2 \theta$

# No Joking Around Trigonometric Identities

Prove each identity.

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

2.  $\sec\theta = \frac{\tan\theta}{\csc\theta} + \cos\theta$

3.  $\frac{1 + \cos\theta}{1 - \cos\theta} = \frac{\sec\theta + 1}{\sec\theta - 1}$

4.  $(\cot\theta + \tan\theta)^2 = \csc^2\theta + \sec^2\theta$

5.  $\frac{\cos\theta}{1 - \sin\theta} = \frac{1}{\sec\theta - \tan\theta}$