

Prove each of the following identities:

1.
$$\frac{\cos t}{1 - \sin t} = \frac{1 + \sin t}{\cos t}$$

2.
$$(1 + \sec x)(1 - \cos x) = \tan x \sin x$$

3.
$$\cos^2\left(\frac{\theta}{2}\right) = \frac{\tan \theta + \sin \theta}{2 \tan \theta}$$

4. $\sin 3\theta = 3 \sin \theta - 4 \sin^3 \theta$

5. $\frac{2 - 2 \cos 2x}{\sin 2x} = \sec x \csc x - \cot x + \tan x$