

Assignment.

Prove each of the following identities.

$$1) \quad \frac{1 + \tan x}{1 + \cot x} = \frac{1 - \tan x}{\cot x - 1}$$

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

$$3) \quad \tan^2 x - \sin^2 x = \sin^2 x \tan^2 x$$

$$4) \quad \tan^2 x - \cos^2 x = \frac{1}{\cos^2 x} - 1 - \cos^2 x$$

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

$$6) \quad (\cos x) (\tan^3 x) = (\sin x) (\tan^2 x)$$

$$7) \quad \sin \left(\frac{\pi}{2} - x \right) \cot \left(\frac{\pi}{2} + x \right) = -\sin x$$

$$8) \quad \frac{\cos 2x + 1}{\sin 2x} = \cot x$$

$$9) \quad (\sin x + \cos x)^2 = 1 + \sin 2x$$

$$10) \quad \cos^4 \theta - \sin^4 \theta = \cos 2\theta$$

$$11) \quad \cot \theta + \tan \theta = 2 \csc 2\theta$$

$$12) \quad \frac{\csc}{\sec} 2\theta = \frac{1}{2} (\sec \theta) (\csc \theta)$$