

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

$$(1 - \sin^2\theta) - \sin^2\theta$$

$$1 - 2\sin^2\theta = 1 - 2\sin^2\theta$$

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2.  $\cot x + \tan x = \csc x \sec x$

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

$$\frac{\cos^2 x + \sin^2 x}{\sin x \cos x}$$

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

$$\csc x \cdot \sec x = \csc x \cdot \sec x \quad \text{"}$$

3.  $\sin^2\theta(\csc^2\theta + \sec^2\theta) = \sec^2\theta$

$$\sin^2\theta \left( \frac{1}{\sin^2\theta} + \frac{1}{\cos^2\theta} \right)$$

$$1 + \frac{\sin^2\theta}{\cos^2\theta}$$

$$1 + \tan^2\theta$$

$$\sec^2\theta = \sec^2\theta$$

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4.  $\cos^2 t - \sin^2 t = 2\cos^2 t - 1$

$$\cos^2 t - (1 - \cos^2 t)$$

$$\cos^2 t - 1 + \cos^2 t$$

$$2\cos^2 t - 1 = 2\cos^2 t - 1 \quad \text{"}$$

5.  $\sec^2 y + \csc^2 y = \sec^2 y \csc^2 y$

$$\frac{1}{\cos^2 y} + \frac{1}{\sin^2 y}$$

$$\frac{\sin^2 y + \cos^2 y}{\cos^2 y \sin^2 y}$$

$$\frac{1}{\cos^2 y \sin^2 y}$$

$$\sec^2 y \cdot \csc^2 y = \sec^2 y \csc^2 y$$

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6.  $\cos^4 x - \sin^4 x = \cos^2 x - \sin^2 x$

$$(\cos^2 x + \sin^2 x)(\cos^2 x - \sin^2 x)$$

$$1(\cos^2 x - \sin^2 x)$$

$$\cos^2 x - \sin^2 x = \cos^2 x - \sin^2 x$$

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$$7. \cos^2\theta \tan^2\theta + \sin^2\theta \tan^2\theta + 1 = \sec^2\theta$$

$$\tan^2\theta (\cos^2\theta + \sin^2\theta) + 1$$

$$\tan^2\theta (1) + 1$$

$$\tan^2\theta + 1$$

$$\sec^2\theta = \sec^2\theta \quad \text{"}$$

$$9. \frac{1+\cos x}{1-\cos x} = \frac{\sec x + 1}{\sec x - 1}$$

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

$$\frac{1}{\cos x} - \frac{\cos x}{\cos x}$$

$$\frac{\sec x + 1}{\sec x - 1} = \frac{\sec x + 1}{\sec x - 1} \quad \text{"}$$

$$11. \sec t + \csc t = (\tan t + \cot t)(\cos t + \sin t)$$

$$= \left( \frac{\sin t}{\cos t} + \frac{\cos t}{\sin t} \right) (\cos t + \sin t)$$

$$= \left( \frac{\sin^2 t + \cos^2 t}{\cos t \sin t} \right) (\cos t + \sin t)$$

$$= \left( \frac{1}{\cos t \sin t} \right) (\cos t + \sin t)$$

$$\sec t + \csc t = \csc t + \sec t$$

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$$8. \frac{\csc y}{\csc y - 1} + \frac{\csc y}{\csc y + 1} = 2 \sec^2 y$$

$$\frac{\csc^2 y + \csc y + \csc^2 y - \csc y}{\csc^2 y - 1}$$

$$\frac{2 \csc^2 y}{\cot^2 y}$$

$$\frac{2}{\frac{\sin^2 y}{\cos^2 y}} = \frac{2}{\sin^2 y} \cdot \frac{\sin^2 y}{\cos^2 y}$$

$$\frac{2}{\cos^2 y} = 2 \sec^2 y = 2 \sec^2 y \quad \text{"}$$

$$10. (\cot x + \tan x)^2 = \csc^2 x \sec^2 x$$

$$\left( \frac{\cos x}{\sin x} + \frac{\sin x}{\cos x} \right)^2$$

$$\left( \frac{\cos^2 x + \sin^2 x}{\sin x \cos x} \right)^2$$

$$\left( \frac{1}{\sin x \cos x} \right)^2$$

$$(\csc x \sec x)^2$$

$$\csc^2 x \sec^2 x = \csc^2 x \sec^2 x$$

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$$12. \frac{\sin x}{1+\cos x} = \csc x - \cot x$$

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

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

$$\frac{1-\cos x}{\sin x}$$

$$\frac{1}{\sin x} - \frac{\cos x}{\sin x}$$

$$\csc x - \cot x = \csc x - \cot x \quad \text{"}$$