Proving Trig Identities

Directions: Move the pieces in the correct sequence to verify the identity.

1. $\cos\alpha + \sin\alpha \tan\alpha = \sec\alpha$

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

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

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

$$\frac{1}{\cos\alpha}$$

$$\sec\alpha$$

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2. $\sin^2\beta \cdot \csc^2\beta - \sin^2\beta = \cos^2\beta$

$$\sin^2\beta\left(\csc^2\beta - 1\right)$$

$$\sin^2\beta\left(\cot^2\beta\right)$$

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

$$\cos^2\beta$$

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3. $\csc\omega - \sin\omega = \cot\omega \cos\omega$

$$\frac{1}{\sin\omega} - \sin\omega$$

$$\frac{1}{\sin\omega} - \sin\omega\left(\frac{\sin\omega}{\sin\omega}\right)$$

$$\frac{1-\sin^2\omega}{\sin\omega}$$

$$\frac{\cos^2\omega}{\sin\omega}$$

$$\frac{\cos\omega}{\sin\omega}\bullet\cos\omega$$

$$\cot\omega\bullet\cos\omega$$

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

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

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

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

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

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

$$\sec x \cdot \csc x$$

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5. $$\frac{\sec\alpha}{\sin\alpha} - \frac{\sin\alpha}{\cos\alpha} = \cot\alpha$$

$$\left(\frac{\cos\alpha}{\cos\alpha}\right)\left[\frac{\sec\alpha}{\sin\alpha} - \frac{\sin\alpha}{\cos\alpha}\right]\left(\frac{\sin\alpha}{\sin\alpha}\right)$$

$$\frac{\sec\alpha\cos\alpha}{\sin\alpha\cos\alpha} - \frac{\sin^2\alpha}{\sin\alpha\cos\alpha}$$

$$\frac{1-\sin^2\alpha}{\sin\alpha\cos\alpha}$$

$$\frac{\cos^2\alpha}{\sin\alpha\cos\alpha}$$

$$\frac{\cos\alpha}{\sin\alpha}$$

$$\cot\alpha$$

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6. $$\frac{1}{1-\cos x}+\frac{1}{1+\cos x}=2\csc^2 x$$

$$\left(\frac{1+\cos x}{1+\cos x}\right)\left[\frac{1}{1-\cos x}+\frac{1}{1+\cos x}\right]\left(\frac{1-\cos x}{1-\cos x}\right)$$

$$\frac{1+\cos x}{1-\cos^2 x}+\frac{1-\cos x}{1-\cos^2 x}$$

$$\frac{1+\cos x+1-\cos x}{1-\cos^2 x}$$

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

$$2\csc^2 x$$

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7. $\dfrac{\sec^2\theta - \tan^2\theta + \tan\theta}{\sec\theta} = \sin\theta + \cos\theta$

$$\frac{\tan^2\theta + 1 - \tan^2\theta + \tan\theta}{\sec\theta}$$

$$\frac{1 + \tan\theta}{\sec\theta}$$

$$\frac{1}{\sec\theta} + \frac{\tan\theta}{\sec\theta}$$

$$\cos\theta + \frac{\sin\theta}{\cos\theta \sec\theta}$$

$$\sin\theta + \cos\theta$$

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8. $\dfrac{1-\sin\theta}{\cos\theta}+\dfrac{\cos\theta}{1-\sin\theta}=2\sec\theta$

$$\left(\frac{1-\sin\theta}{1-\sin\theta}\right)\left[\frac{1-\sin\theta}{cos\theta}+\frac{\cos\theta}{1-\sin\theta}\right]\left(\frac{\cos\theta}{\cos\theta}\right)$$

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

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

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

$$\frac{2}{\cos\theta}$$

$$2\sec\theta$$