

VERIFYING TRIGONOMETRIC IDENTITIES

Section 5.2

Precalculus PreAP/Dual, Revised ©2017

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STEPS

- A. Work at one side ONLY. Generally speaking, focus on the more complicated side first**
- B. Identify any opportunities to factor an expression, such as adding fractions, squaring a binomial, etc...**
- C. Apply whatever sine and cosine functions are applicable**
- D. Simplify the equation by using all applicable theorems and identities**
- E. CANCEL, CANCEL, CANCEL**
- F. At its conclusion, left equals to the right**
- G. Remember, there is MORE THAN ONE WAY to solve an equation**

REVIEW

Simplify $\frac{x^2-1}{x}$

$$\frac{\cancel{x} x^2 - 1}{\cancel{x}} = x - 1$$

NO!

EXAMPLE 1

Verify the identity $\frac{\sec^2 \theta - 1}{\sec^2 \theta} = \sin^2 \theta$

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

$$\sec^2 \theta - 1 = \tan^2 \theta$$

$$\frac{\tan^2 \theta}{\sec^2 \theta}$$

$$\frac{\tan^2 \theta}{\sec^2 \theta}$$

$$\frac{\tan^2 \theta}{\sec^2 \theta}$$

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

$$\cos^2 \theta$$

EXAMPLE 1

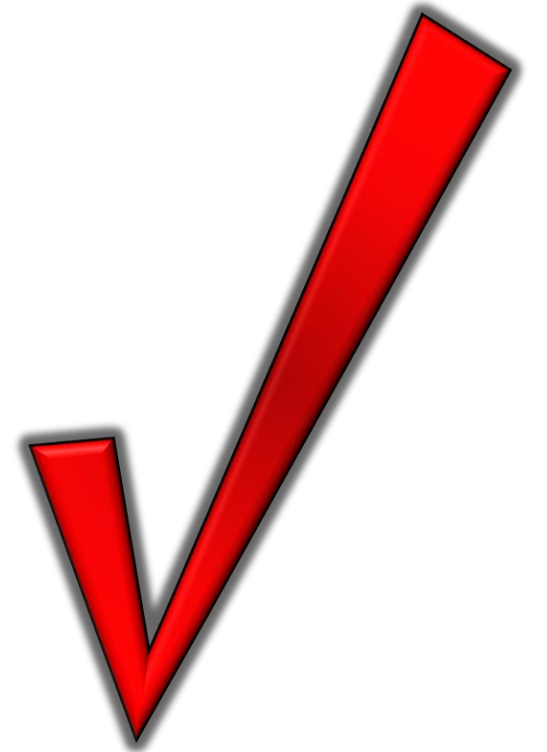
Verify the identity $\frac{\sec^2 \theta - 1}{\sec^2 \theta} = \sin^2 \theta$

$$\tan^2 \theta \div \frac{1}{\cos^2 \theta}$$

$$\tan^2 \theta \cdot \cos^2 \theta$$

$$\frac{\sin^2 \theta}{\cancel{\cos^2 \theta}} \cdot \cancel{\cos^2 \theta}$$

$$\sin^2 \theta = \sin^2 \theta$$



EXAMPLE 2

Verify the identity $\frac{1}{1-\sin \alpha} + \frac{1}{1+\sin \alpha} = 2\sec^2 \alpha$

$$\sec^2 \alpha = \sec^2 \alpha$$

YOUR TURN

Verify the identity $-\tan^2 x = (\tan^2 x + 1)(\cos^2 x - 1)$

$$-\tan^2 x = -\tan^2 x$$

EXAMPLE 4

Verify the identity $\frac{\sin^2 x}{\cos x} + \cos x = \sec x$

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

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

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

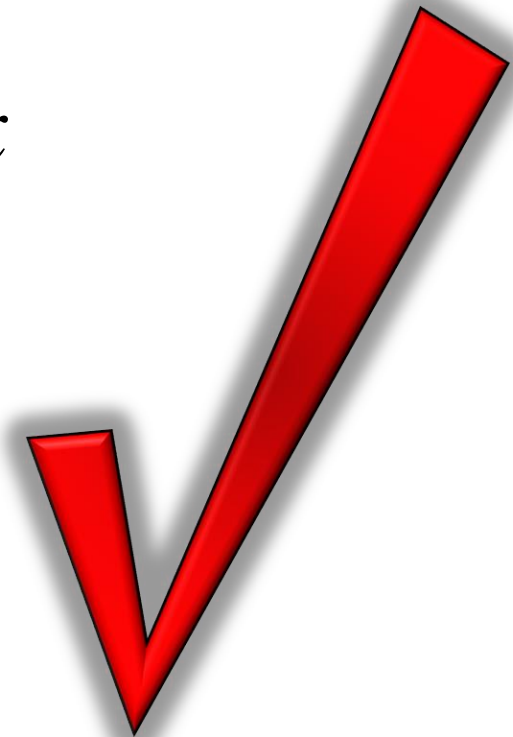
EXAMPLE 4

Verify the identity $\frac{\sin^2 x}{\cos x} + \cos x = \sec x$

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

$$\frac{1}{\cos x} = \sec x$$

$$\sec x = \sec x$$



EXAMPLE 5

Verify the identity $\csc x - \sin x = \cos x \cot x$

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

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

$$\frac{\cos^2 x}{\sin x} = \cos x \cot x$$

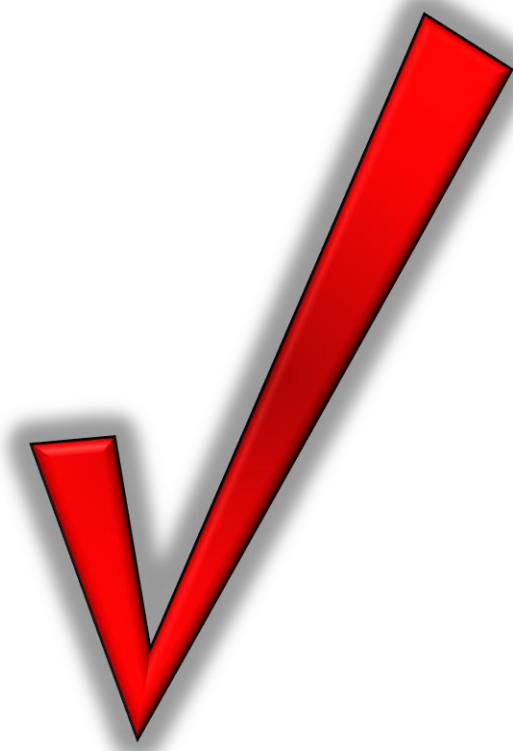
EXAMPLE 5

Verify the identity $\csc x - \sin x = \cos x \cot x$

$$\frac{\cos^2 x}{\sin x} = \cos x \cot x$$

$$\cos x \cdot \frac{\cos x}{\sin x} = \cos x \cot x$$

$$\cos x \cot x = \cos x \cot x$$



EXAMPLE 5 – ANOTHER WAY

Verify the identity $\csc x - \sin x = \cos x \cot x$

$$\csc x - \sin x = \cos x \frac{\cos x}{\sin x}$$

$$\csc x - \sin x = \frac{\cos^2 x}{\sin x}$$

$$\csc x - \sin x = \frac{1 - \sin^2 x}{\sin x}$$

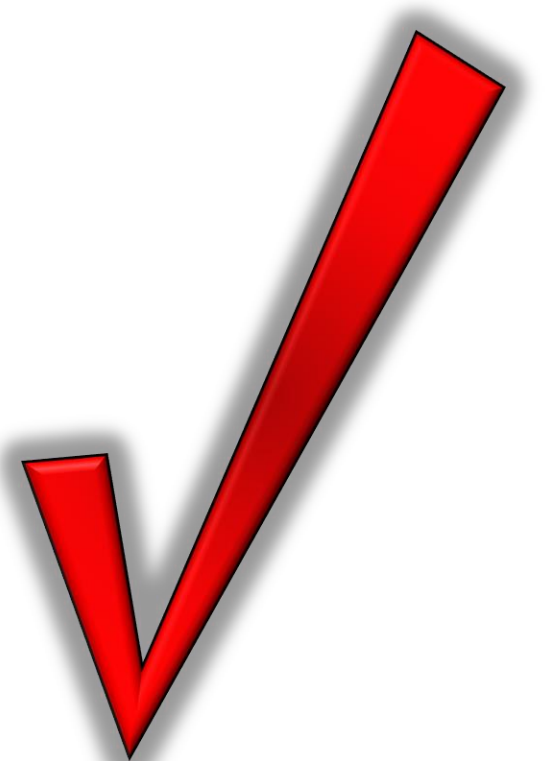
EXAMPLE 5 – ANOTHER WAY

Verify the identity $\csc x - \sin x = \cos x \cot x$

$$\csc x - \sin x = \frac{1 - \sin^2 x}{\sin x}$$

$$\csc x - \sin x = \frac{1}{\sin x} - \frac{\sin^2 x}{\sin x}$$

$$\csc x - \sin x = \csc x - \sin x$$



YOUR TURN

Verify the identity $\tan x + \cot x = \sec x \csc x$

$$\sec x \csc x = \sec x \csc x$$

EXAMPLE 6

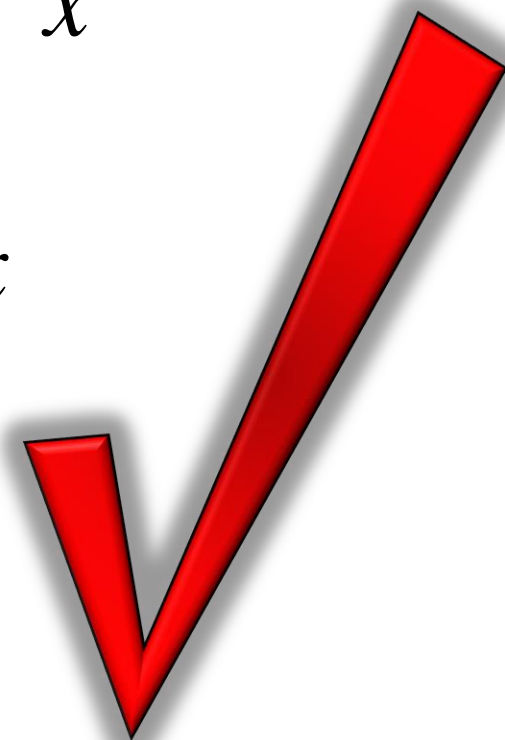
Verify the identity $\sin x(\csc x - \sin x) = \cos^2 x$

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

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

$$1 - \sin^2 x = \cos^2 x$$

$$\cos^2 x = \cos^2 x$$



YOUR TURN

Verify the identity $\csc x = \sin x + \cos x \cot x$

$$\csc x = \sin x + \cos x \cot x$$

ASSIGNMENT

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9-39 odd, 43, 45 (omit 21)