WARM - UP

Simplify

$$\frac{5x+17}{x^2+8x+7} - \frac{3}{x+7}$$

$$\frac{\frac{6}{x-5}}{\frac{2}{x-5}}$$

$\frac{5x+17}{(x+7)(x+1)} - \frac{3\cdot(x+1)}{(x+7)\cdot(x+1)}$

$= \frac{5x+17}{\sim} - \frac{3x+3}{\sim}$

$= \frac{2x+14}{(x+1)(x+7)}$

$= \frac{2(x+7)}{(x+1)(x+7)}$

$= \boxed{\frac{2}{x+1}}$

$\frac{6}{(x-5)} \cdot \frac{(x-5)}{2}$

$\frac{6}{2} \rightsquigarrow \boxed{3}$

May 18-8:51 AM

14-1 (A.7) - Trig. Identities

A **trigonometric identity** in one variable is a trigonometric equation that is true for all values of the variable for which all expressions in the equation are defined.

Essential Understanding The interrelationships among the six basic trigonometric functions make it possible to write trigonometric expressions in various equivalent forms, some of which can be significantly easier to work with than others in mathematical applications.

Some trigonometric identities are definitions or follow immediately from definitions.

take note

Key Concept Basic Identities

Reciprocal Identities

$\csc\theta = \frac{1}{\sin\theta}$ $\quad \sec\theta = \frac{1}{\cos\theta}$ $\quad \tan\theta = \frac{1}{\cot\theta}$

$\sin\theta = \frac{1}{\csc\theta}$ $\quad \cos\theta = \frac{1}{\sec\theta}$ $\quad \cot\theta = \frac{1}{\tan\theta}$

Tangent Identity $\tan\theta = \frac{\sin\theta}{\cos\theta}$

Cotangent Identity $\cot\theta = \frac{\cos\theta}{\sin\theta}$

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Verifying an Identity Using Basic Identities

Ex.1 Verify the identity.

$(\sin\theta)(\sec\theta) = \tan\theta$

$(\sin\theta)\dfrac{1}{(\cos\theta)} = \tan\theta$

$\dfrac{\sin\theta}{\cos\theta} = \tan\theta$

$\tan\theta \overset{\checkmark}{=} \tan\theta$

$\cos\theta\csc\theta\tan\theta = 1$

$\cos\theta \cdot \dfrac{1}{\sin\theta} \cdot \dfrac{\sin\theta}{\cos\theta} = 1$

$\dfrac{\cos\theta}{\sin\theta} \cdot \dfrac{\sin\theta}{\cos\theta} = 1$

$1 = 1$ ✓

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Verifying an Identity Using Basic Identities

Ex.2 Verify the identity.

$$\frac{\csc\theta}{\sec\theta} = \cot\theta$$

$$\frac{\frac{1}{\sin\theta}}{\frac{1}{\cos\theta}} = \cot\theta$$

$$\frac{1}{\sin\theta} \cdot \frac{\cos\theta}{1} = \cot\theta$$

$$\frac{\cos\theta}{\sin\theta} = \cot\theta$$

$\cot\theta = \cot\theta$ ✓

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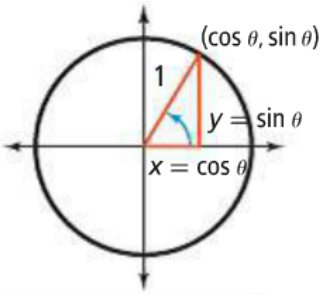
take note

Key Concept Pythagorean Identities

$\cos^2\theta + \sin^2\theta = 1$ $\quad 1 + \tan^2\theta = \sec^2\theta$ $\quad 1 + \cot^2\theta = \csc^2\theta$

You can use the unit circle and the Pythagorean Theorem to verify another identity. The circle with its center at the origin with a radius of 1 is called the unit circle, and has an equation $x^2 + y^2 = 1$.



Every angle θ determines a unique point on the unit circle with x- and y-coordinates $(x, y) = (\cos\theta, \sin\theta)$.

Therefore, for every angle θ,

$(\cos\theta)^2 + (\sin\theta)^2 = 1$ or $\cos^2\theta + \sin^2\theta = 1$.

This form allows you to write the identity without using parentheses.

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Ex.3 Simplifying an Expression

Simplify.

$= \csc\theta\tan\theta$

$= \frac{1}{\sin\theta} \cdot \frac{\sin\theta}{\cos\theta}$

$= \frac{1}{\cos\theta}$

$= \sec\theta$

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Ex.4 Simplifying an Expression

Simplify.

$$\cot\theta(\tan\theta+\cot\theta)$$

$\cot\theta\cdot\tan\theta+\cot^2\theta$

$\frac{\cos\theta}{\sin\theta}\cdot\frac{\sin\theta}{\cos\theta}+\cot^2\theta$

$1+\cot^2\theta$

$\csc^2\theta$

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Ex.5 Verify the identity.

$\sin^2\theta\sec\theta+\cos\theta=\sec\theta$

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

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

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

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

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

$\sec\theta=\sec\theta$ ✓

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HW:

p: 908:

#'s: 7 - 27 odds, 49, 51 (*Don't worry about domain*)

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