Happy Thursday, March 2nd

Do Now: Take out proof cutout activity. Prepare EXPLANATIONS for steps for the proof of your group number. (i.e. group 1 will present explanations for proof 1).

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Each group will present explanations for one proof.

As a presenter:

-Each group member must speak.

-Answer any questions your class has

As an audience member:

-Write down explanations

-Ask questions (if needed)

-Write down anything you notice is SIMILAR to your proof.

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Proving Trig Identities

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

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

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

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

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

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

$\sec\alpha$

$x(3x)$ $3x^2 - x$

Proving Trig Identities

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

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

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

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

$\cos^2\beta$

Proving Trig Identities

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

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

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

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

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

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

$$\cot\omega\cdot\cos\omega$$

Proving Trig Identities

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

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

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

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

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

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

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

Proving Trig Identities

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

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

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

$\dfrac{1}{\cos\alpha}\cdot\cos\alpha$ $\dfrac{(1-\sin^2\alpha)}{\sin\alpha\cos\alpha}$

$\dfrac{(\cos^2\alpha)}{\sin\alpha\cos\alpha}$

$\dfrac{\cos\alpha}{\sin\alpha}$

$\cot\alpha$

$\dfrac{\frac{1}{\cos\alpha}}{\sin\alpha}$ $\dfrac{\frac{1}{2}}{3}$ $\frac{1}{2}\cdot\frac{1}{3}$

$\Rightarrow \dfrac{1}{\cos\alpha}\cdot\dfrac{1}{\sin\alpha}$

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Proving Trig Identities

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

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

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

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

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

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

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

$2\csc^2 x$

Proving Trig Identities

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

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

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

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

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

$\sin\theta+\cos\theta$

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

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

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

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

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

$\dfrac{2}{\cos\theta}$

$2\sec\theta$

What do you notice

* Common denom
  → add fractions

* Split Fraction
* Cancel terms
* Pythag. Identity
* usually sin/cos

* Factor

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

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

$\tan^4x-\cot^4x$

$(\tan^2x-\cot^2x)(\tan^2x+\cot^2x)$

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Tips and Tricks

1) ALWAYS work on only one side

2) Try to get things in terms of sin/cos

3) Watch for factoring/distributing

4) Adding fractions with common denominators

5) Try something, anything.

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King $\sin^2 x + \cos^2 x = 1$

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

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

Queen $1 + \tan^2 x = \sec^2 x$

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

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

3 The Prince ~~Princess Kyle~~ & Squire Seth Regent Ryan

The Monell Eq

The Monell Eq $1 + \cot^2 x = \csc^2 x$

$1 = \csc^2 x - \cot^2 x$

$\cot^2 x = \csc^2 x - 1$

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KING $\sin^2 x + \cos^2 x = 1$

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

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

Queen $\tan^2 x + 1 = \sec^2 x$

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

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

Princess Cade $\cot^2 x + 1 = \csc^2 x$

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5 RHS

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

Multiply by Conjugate

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

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