Warm - Up

Prove: $\frac{x^2-1}{x-1} - \frac{x^2-1}{x+1} = 2$

$$\frac{(x+1)\cancel{(x-1)}}{\cancel{x-1}} - \frac{\cancel{(x+1)}(x-1)}{\cancel{x+1}}$$

$$(x+1) - (x-1)$$

$$\cancel{x}+1-\cancel{x}+1$$

$$2$$

SWBAT prove trigonometric identities

Agenda:
- Warm-Up
- Example of Proofs
- Group Work
- Exit Card

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Proving Strategies:

1) Go from left side and match it to the right side
2) Take the complex and go to less complex
3) Use algebraic identities to set up Pythagorean identity

Helpful hint:
If all else fails, try to put parts in terms of sine/cosine

Example 1:

Prove: tanx + cotx = (secx)(cscx)

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

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

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

$$= (\csc x)(\sec x)$$

Example 2:

Given the function: $f(x) = \boxed{\frac{1}{secx - 1} + \frac{1}{secx + 1}}$

match with 2(cotx)(cscx)

$$\frac{secx+1}{(secx+1)} \cdot \frac{1}{(secx-1)} + \frac{1}{secx+1} \cdot \frac{secx-1}{secx-1}$$

$$\frac{\cancel{secx+1}+\cancel{secx-1}}{sec^2x-1}$$

$$\frac{2secx}{tan^2x}$$

$$\frac{2secx}{tan^2x} = 2secx \cdot \frac{1}{tan^2x}$$

$$2secx \cdot cot^2x$$

$$\frac{2}{\cancel{cosx}} \cdot \frac{cos^{\cancel{2}}x}{sin^2x}$$

$$\frac{2cosx}{sin^2x} = \frac{2cosx}{sinx \cdot sinx}$$

$$2\frac{1}{sinx} \cdot \frac{cosx}{sinx} = 2cscx\,cotx$$

Problem

Prove the identity: $\frac{cosx}{1 - sinx} = \frac{1 + sinx}{cosx}$

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

$$\frac{\cancel{cosx}(1+sinx)}{cos^2x} \qquad \frac{1+sinx}{cosx}$$

Exit Card:
Prove the identity

$$\frac{cos^2x - 1}{cosx} = -tanx \cdot sinx$$