5.2 Day 1

Monday, April 1, 2019 9:52 AM

ex: 1 Prove $\tan x + \cot x = \sec x \csc x$

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

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

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

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

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

$= \sec x \csc x$ ☺

2. you try... prove $\frac{1}{\sec x - 1} + \frac{1}{\sec x + 1} = 2 \cot x \csc x$

$= \frac{\sec x + 1 + \sec x - 1}{(\sec x - 1)(\sec x + 1)}$

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

$= \frac{2 \sec x}{\tan^2 x}$

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

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

$= 2 \cdot \frac{\cos x}{\sin x \cdot \sin x}$

$= 2 \cdot \frac{\cos x}{\sin x} \cdot \frac{1}{\sin x}$

$= 2 \cot x \cdot \csc x$

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3. prove, $\frac{\cot^2 u}{1 + \csc u} = \cot u (\sec u - \tan u)$

$= \csc^2 x - 1$

$a^2 - b^2 = (a-b)(a+b)$

think about

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

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

$$= \frac{(\csc x - 1)(\csc x + 1)}{1 + \csc u}$$

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

$$= \frac{\cos u}{\sin u}\left(\frac{1}{\cos u} - \frac{\sin u}{\cos u}\right)$$

$$= \cot u(\sec u - \tan u)$$ ☺

Think about:

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

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

you try... kinda...

prove $\dfrac{\cos x}{1 - \sin x} = \dfrac{1 + \sin x}{\cos x}$

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

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

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

$1 - \sin^2 x$

$a^2 - b^2 = (a - b)(a + b)$