5.2. Verify Trig Identities Thursday, March 21, 2019 8:06 AM & Reminder: sin (-x) = - sin(x); cos(-x) = cos(x) Pythagonean: $\sin^2(x) + \cos^2(x) = 1$ $tan^{2}(x) + 1 = sec^{2}(x)$ $\cot^{2}(x) + 1 = \csc^{2}(x)$ Reciprocal: $\operatorname{Rec}(x) = \frac{1}{\cos(x)}$; $\operatorname{csc}(x) = \frac{1}{\operatorname{Nin}(x)}$ Quichant: $\tan(x) = \frac{\sin(x)}{\cos(x)}$; $\operatorname{cot}(x) = \frac{\cos(x)}{\operatorname{Nin}(x)}$ Fria. Identity Trig Identity A trig identity is an equation that holds for any angle x (on angle Θ) How to verify a trig identity LHS = RHS.* Pick a side one side of the equation to work with. * Use the fundamental identities above on algobraic identities / operations (distribute, factor, combine like

Thursday, March 21, 2019 8:15 AM

terms, add/ subtract/multiply/divide fractions) to change that side until you get the same expression as the other side. E.g. Verify the given identity. (1) $\frac{\cot(x)}{\cot(x)} = \cos(x)$ divide fructions LHS = $\frac{\cot(x)}{\cot(x)} = \frac{\cos(x)}{\sin(x)} = \frac{\sin(x)}{\sin(x)}$ LHS = $\frac{\cot(x)}{\cot(x)} = \frac{1}{\sin(x)} = \frac{\sin(x)}{1}$ mult: quotient, recipreced common factor fraction of $\frac{1}{\sin(x)} = \cos(x) = RHS$. $\frac{1}{\sin(x)} = \cos(x) = RHS$. $\frac{1}{\sin(x)} = \cos(x) = RHS$. 2 $\cot(x) + \tan(x) = \sec(x) \cdot \csc(x)$ $RHS = Sec(x) \cdot cSc(x) = \frac{1}{coS(x)} \cdot \frac{1}{Sin(x)} = \frac{1}{coS(x) \cdot Sin(x)}$ $Pytherefore \\ identify = \frac{Sin(x) + coS^2(x)}{cOS(x) \cdot Sin(x)}$

Thursday, March 21, 2019 8:29 AM $= \frac{\sin^2(x)}{\cos(x) \cdot \sin(x)} + \frac{\cos^2(x)}{\cos(x) \cdot \sin(x)}$ $= \frac{\sin(x)}{\cos(x)} + \frac{\cos(x)}{\sin(x)} = \tan(x) + \cot(x)$ = LHSquotient 3 $\sin^4(x) - \cos^4(x) = 2\sin^2(x) - 1$. Difference between Squares Factorization Formula: $A^{2} - B^{2} = (A+B)(A-B)$ LHS = $Ain^{4}(x) - con^{4}(x) = (Ain^{2}(x))^{2} - (con^{2}(x))^{2}$ $= \left(\operatorname{Sin}^{2}(x) + \operatorname{con}^{2}(x) \right) \cdot \left(\operatorname{Sin}^{2}(x) - \operatorname{con}^{2}(x) \right)$ Pythayorean Identity $= \sin^2(x) - \cos^2(x)$ $= \sin^2(x) - (1 - \sin^2(x))$ $= nin^{2}(x) - 1 + sin^{2}(x)$ $= 2 \sin^2(x) - 1 = RHS$

Thursday, March 21, 2019 8:46 AM

$$4 \frac{4}{1 - nin(x)} + \frac{1}{1 + sin(x)} = 2 sec^{2}(x)$$

$$HS = \frac{1 \cdot (1 + nin(x))}{(1 - nin(x))(1 - nin(x))} + \frac{1 \cdot (1 - nin(x))}{(1 + nin(x))(1 - nin(x))}$$

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

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

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

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

Thursday, March 21, 2019 995,000

$$= \frac{(con(x) + nin(x))}{(con(x) - nin(x))}$$

$$= \frac{(con(x) + nin(x))}{(con(x) - nin(x))}$$

$$= \frac{(con(x) + nin(x))}{(con(x) - nin(x))}$$

$$RHS = \frac{1 + tan(x)}{1 - tan(x)} = \frac{1 \cdot m_{1}^{2} - nin(x)}{(con(x))}$$

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$$= \frac{(con(x) + nin(x))}{(con(x) - nin(x))}$$

$$= \frac{(con(x) + nin(x))}{(con(x) - nin(x))}$$

$$= \frac{(con(x) + nin(x))}{(con(x) - nin(x))}$$

$$So, [LHS = RHS (b]c hoth = \frac{(con(x) + nin(x))}{(con(x) - nin(x))}$$

$$I(A) = \frac{(con(x) + nin(x))}{(con(x) - nin(x))}$$