Precalc Trig Identities Practice Part 1

$$\tan^2\theta = \csc^2\theta\tan^2\theta - 1$$

$$\frac{1}{\cancel{\sin^2(\theta)}} \cdot \frac{\cancel{\sin^2(\theta)}}{\cos^2(\theta)} - 1$$

$$\frac{1}{\cos^2(\theta)} - 1$$

$$\sec^2(\theta) - 1$$

$$\tan^2(\theta)$$

pyth ID

$$\tan^2(\theta)+1=\sec^2(\theta)$$

$$-1 \qquad -1$$

$$\tan^2(\theta)=\sec^2(\theta)-1$$

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

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

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

pyth ID

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

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

$$(\sin x + \cos x)(\tan x + \cot x) = \sec x + \csc x$$

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

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

pyth ID

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

$$(\sin(x)+\cos(x))\left(\frac{1}{\cos(x)\sin(x)}\right)$$

$$\frac{\cancel{\sin(x)}}{\cos(x)\cancel{\sin(x)}} + \frac{\cancel{\cos(x)}}{\cancel{\cos(x)}\sin(x)}$$

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

$$\sec(x)+\csc(x)$$

$\sin(x)=S \quad \cos(x)=C$

$$(\sin x - \cos x)^2 + (\sin x + \cos x)^2 = 2$$

$$(S-C)^2+(S+C)^2$$

$$S^2 \cancel{-2SC} + C^2 + S^2 \cancel{+2SC} + C^2$$

$$\underbrace{S^2+C^2}_{1} + \underbrace{S^2+C^2}_{1}$$

$$1+1$$

$$2$$

$\sin(x) = S$

$$\frac{1+\sin x}{1-\sin x} - \frac{1-\sin x}{1+\sin x} = 4\tan x \sec x$$

$$\frac{1+S}{1-S} \times \frac{1-S}{1+S}$$

$$\frac{(1+S)^2 - (1-S)^2}{(1-S)(1+S)}$$

$$\frac{(1+2S+S^2) - (1-2S+S^2)}{(1-S)(1+S)}$$ Foil

$$\frac{\cancel{1}+2S+\cancel{S^2}-\cancel{1}+2S-\cancel{S^2}}{1-S^2}$$

pyth ID
$S^2+C^2=1$
$C^2=1-S^2$

$$\frac{4\sin(x)}{\cos^2(x)}$$

$$4\,\frac{\sin(x)}{\cos(x)} \cdot \frac{1}{\cos(x)}$$

$$4\tan(x)\sec(x)$$

$$\sin x - \sin x \cos^2 x = \sin^3 x$$

$$\sin(x)\left(1-\cos^2(x)\right)$$

pyth ID
$S^2+C^2=1$
$S^2=1-C^2$

$$\sin(x)\left(\sin^2(x)\right)$$

$$\sin^3(x)$$

$\sin(\beta) = S \quad \cos(\beta) = C$

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

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

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

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

$$\frac{\sin^2(x)\sin^2(x)}{\cos^2(x)}$$

$$\frac{\sin^2(x)}{\cos^2(x)} \cdot \sin^2(x)$$

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

pyth ID

$S^2 + C^2 = 1$

$S^2 = 1 - C^2$

$$\frac{\csc\beta}{\sin\beta} - \frac{\cot\beta}{\tan\beta} = 1$$

$$\frac{1/S}{S} - \frac{C/S}{S/C}$$

$$\frac{1}{S^2} - \frac{C^2}{S^2}$$

$$\frac{1 - \cos^2(\beta)}{\sin^2(\beta)}$$

$$\frac{\sin^2(\beta)}{\sin^2(\beta)}$$

$$1$$

$$\underbrace{\frac{\sin^2 x}{\cos^2 x + 3\cos x + 2}}_{\text{let } \cos(x) = t} = \frac{1-\cos x}{2+\cos x}$$

t^2+3t+2

$(t+1)(t+2)$

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

pyth ID

$S^2+C^2=1$

$S^2=1-C^2$

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

difference of squares

$$\frac{(1-\cos(x))\cancel{(1+\cos(x))}}{\cancel{(\cos(x)+1)}(\cos(x)+2)}$$

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

$\sin(x) = S \quad \cos(x) = C$

$$\cos^2 x = \frac{\csc x \cos x}{\tan x + \cot x}$$

$$\frac{\frac{1}{S}\cdot C}{\frac{S}{C} + \frac{C}{S}}$$

$$\frac{C/S}{\frac{S^2+C^2}{SC}}$$

pyth ID

$S^2+C^2=1$

$$\frac{C/S}{1/SC}$$

$$\frac{\cancel{\sin(x)}\cos(x)\cos(x)}{\cancel{\sin(x)}}$$

$\cos^2(x)$

$$\frac{\sin^4 x - \cos^4 x}{\sin^2 x - \cos^2 x} = 1$$

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

diff of squares

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

pyth ID

$S^2 + C^2 = 1$

$$1$$

$$\frac{\cos x + 1}{\sin^3 x} = \frac{\csc x}{1 - \cos x}$$

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

pyth ID

$S^2 + C^2 = 1$

$S^2 = 1 - C^2$

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

diff of squares

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

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

$$\frac{\csc(x)}{1 - \cos(x)}$$

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

mult by conjugate

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

FOIL

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

pyth ID

$S^2+C^2=1$

$C^2=1-S^2$

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

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

$\sin(x)=S \quad \cos(x)=C$

$$\sin^4 x - \cos^4 x = 1 - 2\cos^2 x$$

$S^4 - C^4$

$\underbrace{(S^2)^2 - (C^2)^2}$

diff of squares

$(S^2-C^2)\underbrace{(S^2+C^2)}$

pyth ID

$S^2+C^2=1$

$\underbrace{\sin^2(x)}-\cos^2(x)$

pyth ID

$S^2+C^2=1$

$S^2=1-C^2$

$(1-\cos^2(x))-\cos^2(x)$

$1-2\cos^2(x)$

$\sin(\alpha) = S \quad \cos(\alpha) = C$

$$\frac{\cos\alpha}{1+\sin\alpha} + \frac{1+\sin\alpha}{\cos\alpha} = 2\sec\alpha$$

$$\frac{C}{1+S} + \frac{1+S}{C}$$

FOIL

$$\frac{C^2 + (1+S)^2}{C(1+S)}$$

$$\frac{C^2 + 1 + 2S + S^2}{C(1+S)}$$

pyth ID

$S^2 + C^2 = 1$

$$\frac{\sin^2(\alpha) + \cos^2(\alpha) + 2\sin(\alpha) + 1}{\cos(\alpha)(1+\sin(\alpha))}$$

$$\frac{2 + 2\sin(\alpha)}{\cos(\alpha)(1+\sin\alpha)} \rightarrow \frac{2\cancel{(1+\sin(\alpha))}}{\cos(\alpha)\cancel{(1+\sin(\alpha))}}$$

$2\sec(\alpha)$

$\sin(x) = S \quad \cos(x) = C$

$$\tan x \sin x + \cos x = \sec x$$

$$\frac{S}{C} \cdot S + C$$

$$\frac{S^2}{C} + \frac{C}{1}$$

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

$$\frac{1}{\cos(x)}$$

$\sec(x)$