MTH-PT Trigonometry Session 19 4/4

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

switch → to sin/cos

Look for: $\sin^2 x + \cos^2 x = 1$

$$\frac{\frac{\cos^2 x}{\sin^2 x}}{(\cos^2 x)\left(\frac{1}{\cos^2 x}\right)} = \csc^2 x - 1$$

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

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

or

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

$$\boxed{\sin^2 x + \cos^2 x = 1}$$

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

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

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

$$\frac{1+\cot^2 x}{\sec x} = \left[\frac{\cot x}{\sin x}\right]$$

$$\frac{1+\dfrac{\cos^2 x}{\sin^2 x}}{\dfrac{1}{\cos x}} = \frac{\left[\dfrac{\sin^2 x}{\sin^2 x}+\dfrac{\cos^2 x}{\sin^2 x}\right]}{\dfrac{1}{\cos x}}$$

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

$$\frac{1}{\sin^2 x} \div \frac{1}{\cos x}$$

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

$$\frac{\cos x}{(\sin x)(\sin x)} \rightarrow \frac{\cot x}{\sin x}$$

$$\frac{\cot x}{\sin x}$$

$$\frac{\sec x + \tan x}{\csc x + 1} = \boxed{\tan x}$$

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

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

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

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

Keep, change, Flip!

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

$$\cos^2 x\left(1+\cot^2 x\right)=\frac{\csc x}{(\sec x)(\tan x)}$$

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

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

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

$$\cos^2 x\left(\frac{1}{\sin^2 x}\right)=\frac{\cos^2 x}{\sin^2 x}=\cot^2 x$$

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

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

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

$\cos 30^\circ = \frac{\sqrt{3}}{2}$ Sum and Difference Identities

$\cos \boxed{15^\circ}$ 30, 45, 60, 90, 120, 135, 150, 180 . . . .

<u>cos</u>

sum: $\cos(A+B) = \cos A \cos B - \sin A \sin B$

difference $\cos(A-B) = \cos A \cos B + \sin A \sin B$

$\cos(15) = \cos(\underset{A}{45} - \underset{B}{30})$ $A = 45^\circ$ $B = 30^\circ$

$\cos(A-B) = \cos A \cos B + \sin A \sin B$

$(\cos 45)(\cos 30) + (\sin 45)(\sin 30)$

$\left(\frac{\sqrt{2}}{2}\right)\left(\frac{\sqrt{3}}{2}\right) + \left(\frac{\sqrt{2}}{2}\right)\left(\frac{1}{2}\right)$

$\frac{\sqrt{6}}{4} + \frac{\sqrt{2}}{4} = \boxed{\frac{\sqrt{6}+\sqrt{2}}{4}}$

$\cos(30) = \boxed{\frac{\sqrt{3}}{2}}$

$\cos(90-60)$

$\cos(90-60) = (\cos 90)(\cos 60) + (\sin 90)(\sin 60)$

$(0)\left(\frac{1}{2}\right) + (1)\left(\frac{\sqrt{3}}{2}\right) = \boxed{\frac{\sqrt{3}}{2}}$