

MTH-PT Trigonometry Session 18 3/27

- 1.) sin/cos
- 2.) Look for $\sin^2 X + \cos^2 X = 1$

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

$$\frac{\boxed{\cos^2 x}}{\sin^2 x} \left\{ \frac{1}{\cancel{\cos^2 x} \cancel{\cos^2 x}} - 1 \right\}$$

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

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

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

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

$$\begin{aligned} \sin^2 x + \cos^2 x &= 1 \\ -\sin^2 x & \quad -\sin^2 x \\ \hline \cos^2 x &= 1 - \sin^2 x \end{aligned}$$

$$\frac{1 + \cot^2 x}{\sec x} = \frac{\cot x}{\sin x}$$

$$\frac{\csc^2 x}{\sec x} = \frac{\cot x}{\sin x}$$

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

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

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

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

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

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

$$1 + \cot^2 x = \csc^2 x$$

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

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

Sum and Difference Identities

Cosine (15°)

Cosine

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

$$\text{difference: } \cos(A-B) = \cos A \cos B + \sin A \sin B$$

Access $0^\circ, 30^\circ, 45^\circ, 60^\circ, 90^\circ, \dots$ $A=45$ $B=30$

$$\cos 15^\circ = \cos \begin{matrix} A & B \\ (45-30) \end{matrix}$$

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

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

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

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

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

$$\text{difference: } \cos(A-B) = \cos A \cos B + \sin A \sin B$$

$$\cos\left(\frac{7\pi}{12}\right)$$

$\frac{7\pi}{12} \div 12 = \frac{180}{12} = 15$
 $\frac{7}{1} * \frac{15}{1} = 105$

$\frac{3\pi}{4} \quad \frac{9\pi}{12} - \frac{2\pi}{12} \quad \frac{\pi}{6} \quad \text{or} \quad \frac{\pi}{3} + \frac{\pi}{4}$
 $\frac{4\pi}{12} + \frac{3\pi}{12}$

$45 + 60$

$$\cos(45+60) \quad A=45 \quad B=60$$

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

$$\cos(45+60) = \cos 45 \cos 60 - \sin 45 \sin 60$$

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

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

Sum & Difference of sine

$$\Rightarrow \text{sum: } \sin(A+B) = \sin A \cos B + \cos A \sin B$$

$$\text{difference: } \sin(A-B) = \sin A \cos B - \cos A \sin B$$

$$\sin 75^\circ \quad \begin{array}{cc} A & B \\ 30 & 45 \end{array}$$

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

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

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

Sum and Difference of Tangent

$$\text{sum } \tan(A+B) = \frac{\tan A + \tan B}{1 - \tan A \tan B}$$

$$\text{difference } \tan(A-B) = \frac{\tan A - \tan B}{1 + \tan A \tan B}$$

Optional Quiz #17

due by
tonight @
midnight

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

you get 6 pt forgiveness on
your lowest quiz

3 pts ^{or} spread around.

HW/Quiz 18 on classmarker
not optimal

Optional HW/Quiz 19

to complete Trig ID
supplemental

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