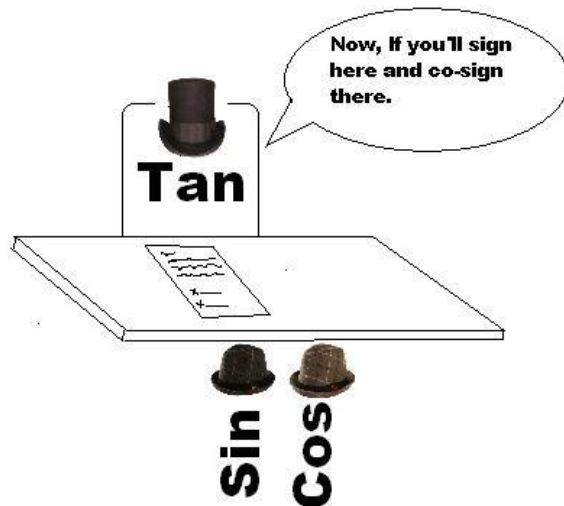


Wednesday, March 8

OPENER BELOW

- ✦ 5.4 - DOUBLE ANGLE IDENTITIES, HALF-ANGLE IDENTITIES
- ✦ PRACTICE



Quiz on 5.3-5.4 is Friday!!! Identities will be given!

Opener: Find

- ①  $\sin 255^\circ$
- ②  $\tan\left(\frac{11\pi}{12}\right)$

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$$\begin{aligned} \textcircled{1} \sin(225 + 30) &= \sin 225 \cos 30 + \cos 225 \sin 30 \\ &= -\frac{\sqrt{2}}{2} \cdot \frac{\sqrt{3}}{2} + \frac{\sqrt{2}}{2} \cdot \frac{1}{2} \\ &= -\frac{\sqrt{6}}{4} + \frac{-\sqrt{2}}{4} = \boxed{\frac{-\sqrt{6} - \sqrt{2}}{4}} \end{aligned}$$

$$\begin{aligned} \textcircled{2} \tan\left(\frac{11\pi}{12}\right) &= \tan\left(\frac{3\pi}{12} + \frac{8\pi}{12}\right) && \tan\left(\frac{9\pi}{12} + \frac{2\pi}{12}\right) \\ &= \tan\left(\frac{\pi}{4} + \frac{2\pi}{3}\right) \\ &= \frac{\tan\frac{\pi}{4} + \tan\frac{2\pi}{3}}{1 - \tan\frac{\pi}{4} \tan\frac{2\pi}{3}} = \frac{1 - \sqrt{3}}{1 - 1 \cdot (-\sqrt{3})} = \boxed{\frac{1 - \sqrt{3}}{1 + \sqrt{3}}} \end{aligned}$$

**5.4** Use Double Angle Identities to Prove:

$$\textcircled{1} \underbrace{\sin 2x}_{\sin(x+x)} = 2 \sin x \cos x \quad (\text{See where Dbl. \(\angle\) Id. came from})$$

$$\sin x \cos x + \cos x \sin x =$$

$$2 \sin x \cos x = 2 \sin x \cos x \checkmark$$

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

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

$$\frac{\cancel{2} \sin^2 x}{\cancel{2}} =$$

$$\sin^2 x = \sin^2 x \checkmark$$

$$\textcircled{3} \frac{2}{1 + \cos 2x} = \sec^2 x$$

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

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

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

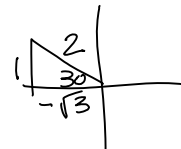
$$\sec^2 x = \sec^2 x \checkmark$$

Half-Angle Identities - Use to  
Find sin/cos/tan of angle

$$\textcircled{1} \sin 75^\circ = \sin \frac{150^\circ}{2} = \sqrt{\frac{1 - \cos 150^\circ}{2}} \quad | \cdot \sqrt{2} |$$

$$\textcircled{1} \quad \sin 75^\circ = \sin \frac{150}{2} = \pm \sqrt{\frac{1 - \cos 150}{2}}$$

(pos) or neg



$$= \sqrt{\frac{1 - \frac{-\sqrt{3}}{2}}{2}} \cdot \frac{2}{2}$$

$$= \sqrt{\frac{2 + \sqrt{3}}{4}} = \boxed{\frac{\sqrt{2 + \sqrt{3}}}{2}}$$

$$\textcircled{2} \quad \tan\left(\frac{\pi}{8}\right) = \tan \frac{\frac{\pi}{4}}{2} = \frac{\sin \frac{\pi}{4}}{1 + \cos \frac{\pi}{4}} = \frac{\frac{\sqrt{2}}{2}}{1 + \frac{\sqrt{2}}{2}} \cdot \frac{2}{2}$$

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