

# 33.

$$\begin{aligned}\cot x &= \frac{\sin 4x + \sin 6x}{\cos 4x - \cos 6x} \\ &= \frac{2 \sin 5x \cdot \cos(-x)}{-2 \sin 5x \cdot \sin(-x)} = \frac{2 \sin 5x \cdot \cos x}{-2 \sin 5x \cdot -\sin x} \\ &= \frac{2 \sin 5x \cdot \cos x}{2 \sin 5x \cdot \sin x} = \cot x\end{aligned}$$

#39 (5.4)

$$\sec^2\left(\frac{A}{2}\right) = \frac{2 \sec A}{\sec A + 1}$$

$$\begin{aligned} & \frac{1}{\cos^2\left(\frac{A}{2}\right)} \\ &= \frac{1}{\left(\sqrt{\frac{1+\cos A}{2}}\right)^2} \\ &= \frac{1}{\frac{1+\cos A}{2}} \\ &= \frac{2}{1+\cos A} \end{aligned}$$

$$\begin{aligned} &= \frac{\frac{2}{\cos A}}{\frac{1}{\cos A} + 1} = \frac{2}{\cos A} \cdot \frac{\cos A}{1+\cos A} \\ &= \frac{2}{1+\cos A} \end{aligned}$$

$$\text{TAN } 22,5^\circ$$

$$= \frac{1 - \cos 45}{\sin 45}$$

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

$$\text{TAN}\left(\frac{A}{2}\right) = \frac{1 - \cos A}{\sin A}$$

#9 (5.3)

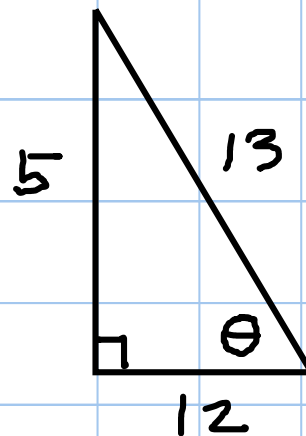
GIVEN:  $\tan \theta = \frac{5}{12}$

$\theta$  IN  $Q I$

FIND:  $\sin 2\theta$

$$2 \sin \theta \cos \theta$$

$$2 \cdot \frac{5}{13} \cdot \frac{12}{13} = \frac{120}{169}$$



$$\cos 2\theta = 2\cos^2\theta - 1$$

$$\begin{aligned}\cos 4x &= \cos(2 \cdot 2x) \\ &= 2 \cos^2 2x - 1 \\ &= 2 (2 \cos^2 x - 1)^2 - 1 \\ &= 2 (4 \cos^4 x - 4 \cos^2 x + 1) - 1 \\ &= 8 \cos^4 x - 8 \cos^2 x + 2 - 1 \\ &= 8 \cos^4 x - 8 \cos^2 x + 1\end{aligned}$$

#41. (section 5.5)

$$\begin{aligned}\tan\left(\frac{B}{2}\right) &= \csc B - \cot B \\ &= \frac{1}{\sin B} - \frac{\cos B}{\sin B} \\ &= \frac{1 - \cos B}{\sin B} \\ &= \tan\left(\frac{B}{2}\right)\end{aligned}$$

$$\sin(15^\circ) = \sin\left(\frac{30}{2}\right)$$

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

$$= \sin\left(\frac{30}{2}\right) = \sqrt{\frac{1 - \cos 30}{2}}$$

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

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

$$= \sqrt{\frac{2 - \sqrt{3}}{4}} = \frac{\sqrt{2 - \sqrt{3}}}{2}$$

$$\tan 15^\circ = \tan\left(\frac{30}{2}\right)$$

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

$$= \frac{\sin 30}{1 + \cos 30} = \frac{\frac{1}{2}}{1 + \frac{\sqrt{3}}{2}}$$

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

$$= \frac{1}{2 + \sqrt{3}}$$

#53 (5.1)

$$\frac{\sin^2 B - \tan^2 B}{1 - \sec^2 B} = \sin^2 B$$

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

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

$$\sin^2 B = \sin^2 B$$