# TRIGONOMETRIC IDENTITIES

$$\cot x - \tan x = 2 \cot 2x$$

$$\tan(A+B) = \tan A + \tan B + \tan A \cdot \tan B \cdot \tan(A+B)$$

$$\text{If } A+B = \frac{\pi}{4} \Rightarrow \tan A + \tan B + \tan A \cdot \tan B = 1$$

$$\cos\alpha + \cos\beta + \cos Y + \cos(\alpha+\beta+y) = 4\cos\left(\frac{\alpha+\beta}{2}\right)\cos\left(\frac{\beta+Y}{2}\right)\cos\left(\frac{Y+\alpha}{2}\right)$$

$$\sin\alpha + \sin\beta + \sin Y - \sin(\alpha+\beta+Y) = 4\sin\left(\frac{\alpha+\beta}{2}\right)\sin\left(\frac{\beta+\gamma}{2}\right)\sin\left(\frac{\gamma+\alpha}{2}\right)$$

$$4\sin x \sin(60-x)\sin(60+x) = \sin 3x$$

$$4\cos x \cos(60-x)\cos(60+x) = \cos 3x$$

$$\tan x \tan(60-x)\tan(60+x) = \tan 3x$$