## TRIGONOMETRY

$$\begin{aligned} \cos(x\pm y) &= (\cos x \cos y \mp \sin x \sin y) \\ \sin(x\pm y) &= \sin x (\cos y \pm \cos x \sin y) \\ \tan(x\pm y) &= \frac{\tan x \pm \tan y}{1 \mp \tan x \tan y} \end{aligned} \qquad \begin{aligned} \cos(+\cos D) &= 2 \cos(\frac{\cot D}{2}) \cdot \cos(\frac{\cot D}{2}) \\ \cos(-\cos D) &= 2 \sin(\frac{\cot D}{2}) \cdot \sin(\frac{\cot D}{2}) \\ \sin(+\sin D) &= 2 \sin(\frac{\cot D}{2}) \cdot \cos(\frac{\cot D}{2}) \end{aligned}$$

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$$\end{aligned}$$

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

$$tan 2x = \underbrace{2tanx}_{1-tan^2x} Sin(3x) = 3sin x - 4sin^3 x$$

$$(\cos (3x)) = 4\cos^3 x - 3\cos x$$
  $\tan (3x) = 3\tan x - \tan^3 x$ 

## INVERSE TRIGONOMETRY

$$\begin{array}{lll} Sin^{-1}(-x) = -Sin^{-1}(x) & Sin^{-1}(x) + Cos^{-1}(x) = \pi/2 \\ tan^{-1}(-x) = -tan^{-1}(x) & tan^{-1}(x) + Cot^{-1}(x) = \pi/2 \\ cot^{-1}(-x) = \pi - Cot^{-1}(x) & (osec^{-1}(x) + Sec^{-1}(x) = \pi/2 \\ Sec^{-1}(-x) = \pi - Sec^{-1}(x) & Sin^{-1}(\frac{1}{x}) = Cosec^{-1}(x) \\ Cosec^{-1}(-x) = - Cosec^{-1}(x) & (osec^{-1}(\frac{1}{x}) = Sec^{-1}(x) \\ Cos^{-1}(-x) = \pi - Cos^{-1}(x) & tan^{-1}(\frac{1}{x}) = Sec^{-1}(x) \\ tan^{-1}(x) \pm tan^{-1}(y) = tan^{-1}(\frac{x \pm y}{1 \mp xy}) & tan^{-1}(x) \pm tan^{-1}(x) \end{array}$$

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