

Trigonometric Identities

- $\sin^2 x + \cos^2 x = 1$
- $\tan^2 x + 1 = \sec^2 x$
- $1 + \cot^2 x = \csc^2 x$
- $\sin^2 x = \frac{1}{2}[1 - \cos(2x)]$
- $\cos^2 x = \frac{1}{2}[1 + \cos(2x)]$
- $\sin x_1 \sin x_2 = \frac{1}{2}[\cos(x_1 - x_2) - \cos(x_1 + x_2)]$
- $\cos x_1 \cos x_2 = \frac{1}{2}[\cos(x_1 - x_2) + \cos(x_1 + x_2)]$
- $\sin x_1 \cos x_2 = \frac{1}{2}[\sin(x_1 - x_2) + \sin(x_1 + x_2)]$
- $\sin(2x) = 2 \sin x \cos x$
- $\cos(2x) = \cos^2 x - \sin^2 x$

Trigonometric Integrals

- $\int \tan x \, dx = \ln |\sec x| + C$
- $\int \sec x \, dx = \ln |\sec x + \tan x| + C$
- $\int \cot x \, dx = \ln |\sin x| + C$
- $\int \csc x \, dx = -\ln |\csc x + \cot x| + C$
- $\int \frac{dx}{x^2 + a^2} = \frac{1}{a} \tan^{-1}\left(\frac{x}{a}\right) + C$