# Trigonometric Formulas

## Differentiation Formula

1. $\frac{d}{dx}(\sin x) = \cos x$
2. $\frac{d}{dx}(\cos x) = -\sin x$
3. $\frac{d}{dx}(\sec x) = \sec x \tan x$
4. $\frac{d}{dx}(\csc x) = -\csc x \cot x$
5. $\frac{d}{dx}(\tan x) = \sec^2 x = 1 + \tan^2 x$
6. $\frac{d}{dx}(\cot x) = -\csc^2 x = -1 - \cot^2 x$
7. $\frac{d}{dx}\left(\sin^{-1} x\right) = \frac{1}{\sqrt{1-x^2}}$
8. $\frac{d}{dx}\left(\cos^{-1} x\right) = -\frac{1}{\sqrt{1-x^2}}$
9. $\frac{d}{dx}\left(\tan^{-1} x\right) = \frac{1}{x^2+1}$
10. $\frac{d}{dx}\left(\cot^{-1} x\right) = -\frac{1}{x^2+1}$
11. $\frac{d}{dx}\left(\sec^{-1} x\right) = \frac{1}{|x|\sqrt{x^2-1}}$
12. $\frac{d}{dx}\left(\csc^{-1} x\right) = -\frac{1}{|x|\sqrt{x^2-1}}$

## Integration Formula

$$\int \sin x \, dx = -\cos x + C$$

$$\int \cos x \, dx = \sin x + C$$

$$\int \sec x \, dx = \ln|\sec x + \tan x| + C$$

$$\int \csc x \, dx = -\ln|\csc x + \cot x| + C$$

$$\int \tan x \, dx = \ln|\sec x| + C$$

$$\int \cot x \, dx = \ln|\sin x| + C$$

$$\int \sin^{-1} x \, dx = x \sin^{-1} x + \sqrt{1-x^2} + C$$

$$\int \cos^{-1} x \, dx = x \cos^{-1} x - \sqrt{1-x^2} + C$$

$$\int \tan^{-1} x \, dx = x \tan^{-1} x - \frac{1}{2}\ln\left(x^2+1\right) + C$$

$$\int \cot^{-1} x \, dx = x \cot^{-1} x + \frac{1}{2}\ln\left(x^2+1\right) + C$$

$$\int \sec^{-1} x \, dx = \text{TBD}$$

$$\int \csc^{-1} x \, dx = \text{TBD}$$

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