

202 Cheat Sheet

$$\sin(x+y) = \sin x \cos y + \cos x \sin y$$

$$\cos(x+y) = \cos x \cos y - \sin x \sin y$$

$$\sin(-x) = -\sin x, \cos(-x) = \cos x$$

$$\tan(x+y) = \frac{\tan x + \tan y}{1 - \tan x \tan y}$$

$$\sin(2x) = 2 \sin x \cos x$$

$$\cos(2x) = \cos^2 x - \sin^2 x$$

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

$$= 1 - 2 \sin^2 x$$

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

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

$$\sinh(-x) = -\sinh(x)$$

$$\cosh(-x) = \cosh(x)$$

$$\cosh^2(x) - \sinh^2(x) = 1$$

$$1 - \tanh^2(x) = \operatorname{sech}^2(x)$$

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

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

$$\sin A \cos B = \frac{1}{2}[\sin(A-B) + \sin(A+B)]$$

$$\sin A \sin B = \frac{1}{2}[\cos(A-B) - \cos(A+B)]$$

$$\cos A \cos B = \frac{1}{2}[\cos(A-B) + \cos(A+B)]$$

$$1 + \tan^2 x = \sec^2 x$$

$$1 + \cot^2 x = \operatorname{csc}^2 x$$

$$\frac{d}{dx}(\operatorname{sech}(x)) = -\operatorname{sech}(x) \tanh(x)$$

$$\frac{d}{dx}(\cosh(x)) = \sinh(x)$$

$$\sinh^{-1}(x) = \ln(x + \sqrt{x^2 + 1}) \quad x \in \mathbb{R}$$

$$\cosh^{-1}(x) = \ln(x + \sqrt{x^2 - 1}) \quad x \geq 1$$

$$\tanh^{-1}(x) = \frac{1}{2} \ln\left(\frac{1+x}{1-x}\right) \quad -1 < x < 1$$

$$\frac{d}{dx}(\sinh^{-1}(x)) = \frac{1}{\sqrt{1+x^2}} \quad \frac{d}{dx}(\cosh^{-1}(x)) = \frac{1}{\sqrt{x^2-1}}$$

$$\frac{d}{dx}(\tanh^{-1}(x)) = \frac{1}{1-x^2} = \frac{d}{dx}(\operatorname{coth}^{-1}(x))$$

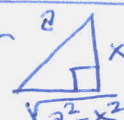
$$\frac{d}{dx}(\operatorname{csch}^{-1}(x)) = \frac{-1}{|x|\sqrt{x^2+1}}$$

$$\frac{d}{dx}(\operatorname{sech}^{-1}(x)) = \frac{-1}{x\sqrt{1-x^2}}$$

Trig Substitution

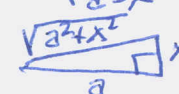
$$\sqrt{a^2 - x^2}$$

$$x = a \sin \theta$$



$$\sqrt{a^2 + x^2}$$

$$x = a \tan \theta$$



$$\sqrt{x^2 - a^2}$$

$$x = a \sec \theta$$

