Derivatives of Trigonometric Functions

$$\frac{d}{dx}\sin(ax) = a\cos(ax)$$

$$\frac{d}{dx}\cos(ax) = -a\sin(ax)$$

$$\frac{d}{dx}\tan(ax) = a\sec^2(ax)$$

$$\frac{d}{dx}\cot(ax) = -a\csc^2(ax)$$

$$\frac{d}{dx}\sec(ax) = a\sec(ax)\tan(ax)$$

$$\frac{d}{dx}\csc(ax) = -a\cot(ax)\csc(ax)$$

$$\frac{d}{dx}\arcsin(ax) = \frac{a}{\sqrt{1-a^2x^2}}$$

$$\frac{d}{dx}\arccos(ax) = -\frac{a}{\sqrt{1-a^2x^2}}$$

$$\frac{d}{dx}\arctan(ax) = \frac{a}{a^2x^2+1}$$

$$\frac{d}{dx}\text{arccot}(ax) = -\frac{a}{a^2x^2+1}$$

$$\frac{d}{dx}\text{arcsec}(ax) = \frac{1}{ax^2\sqrt{1-\frac{1}{a^2x^2}}}$$

$$\frac{d}{dx}\text{arccsc}(ax) = -\frac{1}{ax^2\sqrt{1-\frac{1}{a^2x^2}}}$$

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

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

$$\frac{d}{dx}\tanh(ax) = a(\text{sech}(x))^2$$

$$\frac{d}{dx}\text{arcsinh}(ax) = \frac{a}{\sqrt{1+a^2x^2}}$$

$$\frac{d}{dx}\text{arccosh}(ax) = \frac{a}{\sqrt{a^2x^2-1}}$$

$$\frac{d}{dx}\text{arctanh}(ax) = \frac{a}{1-a^2x^2}$$