## Differentiation Rules:

$$\frac{d}{dx}[\arcsin u] = \frac{u'}{\sqrt{1-u^2}} \qquad \frac{d}{dx}[\arccos u] = \frac{-u'}{\sqrt{1-u^2}} \qquad \frac{d}{dx}[\arctan u] = \frac{u'}{1+u^2}$$

$$\frac{d}{dx}[\operatorname{arccot} u] = \frac{-u'}{1+u^2} \qquad \frac{d}{dx}[\operatorname{arcsec} u] = \frac{u'}{|u|\sqrt{u^2-1}} \qquad \frac{d}{dx}[\operatorname{arccsc} u] = \frac{-u'}{|u|\sqrt{u^2-1}}$$

$$\frac{d}{dx}[\sinh u] = \cosh u \cdot u' \qquad \frac{d}{dx}[\cosh u] = \sinh u \cdot u' \qquad \frac{d}{dx}[\tanh u] = sech^2 u \cdot u'$$

$$\frac{d}{dx}[\coth u] = -\operatorname{csch}^2 u \cdot u' \qquad \frac{d}{dx}[\operatorname{sech} u] = -(\operatorname{sech} u \tanh u) \cdot u' \qquad \frac{d}{dx}[\operatorname{csch} u] = -(\operatorname{csch} u \coth u) \cdot u'$$

$$\frac{d}{dx}[\sinh^{-1} u] = \frac{u'}{\sqrt{u^2+1}} \qquad \frac{d}{dx}[\cosh^{-1} u] = \frac{u'}{\sqrt{u^2-1}} \qquad \frac{d}{dx}[\tanh^{-1} u] = \frac{u'}{1-u^2}$$

$$\frac{d}{dx}[\coth^{-1} u] = \frac{u'}{1-u^2} \qquad \frac{d}{dx}[\operatorname{sech}^{-1} u] = \frac{-u'}{u\sqrt{1-u^2}} \qquad \frac{d}{dx}[\operatorname{csch}^{-1} u] = \frac{-u'}{|u|\sqrt{1+u^2}}$$

## Integration Formulas:

$$\int \sec u \, du = \ln|\sec u + \tan u| + C \qquad \int \csc u \, du = -\ln|\csc u + \cot u| + C$$

$$\int \sec^2 u \, du = \tan u + C \qquad \int \csc^2 u \, du = -\cot u + C$$

$$\int \csc u \cot u \; du = -\csc u + C \qquad \int \sec u \tan u \; du = \sec u + C$$

$$\int \frac{du}{a^2+u^2} = \frac{1}{a}\arctan\frac{u}{a} + C \qquad \int \frac{du}{\sqrt{a^2-u^2}} = \arcsin\frac{u}{a} + C$$

$$\int \frac{du}{u\sqrt{u^2-a^2}} = \frac{1}{a}\operatorname{arcsec}\frac{|u|}{a} + C$$