Math 262
Differentiation and Integration Rules Related to inverse Trigonometric Functions.

A. Differentiation Rules:

1. $\dfrac{d}{dx}\left(\arcsin u\right) = \dfrac{1}{\sqrt{1-u^2}}\dfrac{du}{dx}$ (for $|u| < 1$).
2. $\dfrac{d}{dx}\left(\arccos u\right) = \dfrac{-1}{\sqrt{1-u^2}}\dfrac{du}{dx}$ (for $|u| < 1$).
3. $\dfrac{d}{dx}\left(\arctan u\right) = \dfrac{1}{1+u^2}\dfrac{du}{dx}$.
4. $\dfrac{d}{dx}\left(\cot^{-1} u\right) = \dfrac{-1}{1+u^2}\dfrac{du}{dx}$.
5. $\dfrac{d}{dx}\left(\sec^{-1} u\right) = \dfrac{1}{u\sqrt{u^2-1}}\dfrac{du}{dx}$ (for $|u| > 1$).
6. $\dfrac{d}{dx}\left(\csc^{-1} u\right) = \dfrac{-1}{u\sqrt{u^2-1}}\dfrac{du}{dx}$ (for $|u| > 1$).

B. Integration Rules:

1. $\displaystyle\int \frac{1}{\sqrt{a^2-u^2}}\,du = \arcsin\left(\frac{u}{a}\right) + C.$ (for $u^2 < a^2$)
2. $\displaystyle\int \frac{1}{a^2+u^2}\,du = \frac{1}{a}\arctan\left(\frac{u}{a}\right) + C.$
3. $\displaystyle\int \frac{1}{u\sqrt{u^2-a^2}}\,du = \frac{1}{a}\sec^{-1}\left(\frac{u}{a}\right) + C.$ (for $|u| > a > 0$)