Section 5.6

Derivatives of Inverse Trigonometric Functions: Let u be a differentiable function of x.

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

1) Find the following:

   a) $\arcsin\left(\frac{\sqrt{3}}{2}\right)$

   b) $\operatorname{arcsec} 2$

   c) $\operatorname{arccot}(-1)$

   d) $\arccos\left(-\frac{1}{2}\right)$

2) Solve $\operatorname{arcsec}(4x-1) = \frac{\pi}{3}$.

3) Given $y = \arctan x$, find $\csc y$.

4) Given $y = \operatorname{arccsc}\left(\frac{\sqrt{13}}{2}\right)$, find $\cot y$.

5) Find the derivatives of the following functions.

a) $y = \arccos(3x)$

b) $y = \operatorname{arccsc} x^2$

c) $y = \operatorname{arccot} 2^{3x}$

6) Find and simplify $\frac{d}{dx}\left[\sqrt{x^2-1} - \operatorname{arcsec} x\right]$. Use your answer to find $\int \frac{\sqrt{x^2-1}}{x}\,dx$.

Homework for 5.6: #5, 17, 23, 29, 41, 53, 77