AP Calculus AB
Class Notes

Name Key

Derivatives of Inverse Trigonometric Functions

Notations for inverse trig functions:

$\sin^{-1}(x) = \arcsin x$

$\tan^{-1}(x) = \arctan x$

* does not mean that the trig function is being raised to the negative one power

$$\frac{d}{dx}\arcsin(u) = \frac{u'}{\sqrt{1-u^2}} \qquad \frac{d}{dx}\arctan(u) = \frac{u'}{1+u^2}$$

Examples:
Find the derivative for each of the following.

1. $f(x) = \arcsin(x^2)$

$f'(x) = \frac{2x}{\sqrt{1-(x^2)^2}}$

$f'(x) = \frac{2x}{\sqrt{1-x^4}}$

2. $y = x\arctan(2x^3)$

$y' = (1)\arctan(2x^3) + (x)\cdot\frac{6x^2}{1+(2x^3)^2}$

$y' = \arctan(2x^3) + \frac{6x^3}{1+4x^6}$

3. $y = (\arcsin x)^2$

$y' = 2(\arcsin x)\cdot\frac{1}{\sqrt{1-x^2}}$

$y' = \frac{2\arcsin x}{\sqrt{1-x^2}}$

4. $g(x) = \arcsin\left(\frac{1}{x}\right)$

$g(x) = \arcsin(x^{-1})$

$g'(x) = \frac{-x^{-2}}{\sqrt{1-(x^{-1})^2}}$

$g'(x) = \frac{-1}{x^2\sqrt{1-\frac{1}{x^2}}}$

5. $f(x) = \arctan(e^{2x})$

$f'(x) = \frac{e^{2x}\cdot 2}{1+(e^{2x})^2}$

$f'(x) = \frac{2e^{2x}}{1+e^{4x}}$

6. $f(x) = \arcsin(4^x)$

$f'(x) = \frac{4^x\cdot\ln 4}{\sqrt{1-(4^x)^2}}$

$f'(x) = \frac{4^x\cdot\ln 4}{\sqrt{1-4^{2x}}}$