4.3 Day 12:48 PM

Derivatives of Inverse Trig.

al sin'x

Think about y=sinx

$$|x = \sin y| \qquad (\Rightarrow \sin^{2} x)$$

$$|x = \cos y \cdot y|$$

$$|x = \frac{1}{\cos y} \qquad (\Rightarrow \sin^{2} x)$$

$$|x = \cos^{2} y = 1 - \sin^{2} y$$

$$|x = \frac{1}{1 - (\sin y)^{2}}$$

$$|x = \frac{1}{1 - (\sin y)^{2}}$$

$$|x = \frac{1}{1 - x^{2}} \qquad (chain Rulp)$$

$$A \frac{d}{dx} \sin^2 x = \frac{1}{1 - x^2}$$

$$\frac{d}{dx} \sin^2 u = \frac{1}{\sqrt{1 - y^2}} \cdot u'$$

ex:
$$\frac{1}{dx} \sin^{-1}(2x) = \sqrt{1-(2x)^2} \cdot 2 = \frac{2}{\sqrt{1-4x^2}}$$

 $\frac{1}{\sqrt{2}} \cos x = \frac{1}{\sqrt{1-x^2}} \qquad \frac{1}{\sqrt{2}} \cos^2 x = \frac{1}{\sqrt{1-x^2}} \cdot u'$

$$\frac{d}{d\eta}\cos^{1}u = \frac{-1}{\sqrt{1-u^{2}}}\cdot u'$$

A $\frac{1}{2x} + \frac{1}{4an} \cdot x = \frac{1}{1+x^2}$ $\frac{1}{2x} + \frac{1}{4an} \cdot u = \frac{1}{1+u^2} \cdot u'$

$$\frac{d}{dx} + a\tilde{n}' u = \frac{1}{1+u^2} \cdot u'$$

$$\frac{d}{dx} \cot^{-1} x = \frac{-1}{1+x^2}$$

$$\frac{d}{dx} \cot^{-1} x = \frac{-1}{1+x^2}$$
 $\frac{d}{dx} \cot^{-1} u = \frac{-1}{1+u^2} \cdot u'$

$$4 \quad \frac{d}{dx} \sec^{1} x = \frac{1}{|x| \sqrt{x^{2}-1}} \quad \frac{d}{dx} \sec^{1} u = \frac{1}{|u| \sqrt{u^{2}+1}} \quad u'$$

$$A = \frac{1}{2} \csc^{2} x = \frac{1}{|x| |x^{2}-1|} \qquad \frac{1}{2} \csc^{2} u = \frac{1}{|u| |u^{2}+1|} u'$$

examples: find y

$$y = 4an^{-1}(x^2-1)$$

$$y' = \frac{1}{1 + (x^2 - 1)^2} (2x)$$

$$y = csc^{-1}(cosx)$$

$$y' = \frac{1}{1 + (x^2 - 1)^2} (2x)$$
 $y' = \frac{-1}{|\cos x| |\cos x - 1} (-\sin x)$ $y' = \cos(x^3 - 2x) (3x^2 - 2)$

a.
$$y = \tan^{-1}(x^2 - 1)$$
 b. $y = (sc^{-1}(cosx))$ c. $y = \sin(x^3 - 2x)$

$$y = \cos^{-1}(\sqrt{x})$$

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

d.
$$y = cos^{-1}(\sqrt{x})$$
 e. $y = sin(cos^{-1}x)$ f. $y = sec^{-1}(3x)$

$$y' = \cos(\cos^{-1}x) \cdot \frac{-1}{\sqrt{1-x^2}}$$
 $y' = \frac{1}{3x}\sqrt{9x^2-1}$

$$y = \sec^{-1}(3x)$$