Inverse or Arc-trig functions:

$\sin^{-1}(\sin\theta) = \sin^{-1}(0.5)$

$\theta = 30^\circ$ or $\frac{\pi}{6}$

$x^{-1} = \frac{1}{x}$ but $\sin^{-1}\theta \neq \frac{1}{\sin\theta} \Rightarrow \csc\theta$

$\sin^{-1}$ undoes $\sin$
$\cos^{-1}$ undoes $\cos$

Like:

$f^{-1}(x) \neq \frac{1}{f(x)}$

$f^{-1}(x)$ is an INVERSE f^n.

NOT an exponent

$$\frac{d}{dx}\sin^{-1}(x) = \frac{1}{\sqrt{1-x^2}}$$

$$\Updownarrow$$

$$\frac{d}{dx}\arcsin(x) = \frac{1}{\sqrt{1-x^2}}$$

$$\frac{d}{dx}\cos^{-1}(x) = -\frac{1}{\sqrt{1-x^2}}\cdot 1$$

$$\downarrow$$

$$\frac{d}{dx}\arccos(x) = -\frac{1}{\sqrt{1-x^2}}$$

$$\frac{d}{dx}\tan^{-1}(x) = \frac{1}{1+x^2}$$

Ex 1: $y = \cos^{-1}(x^2)$

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

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

$y = (\arcsin x)^2$

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

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

(3) $y = (1+x^2)\tan^{-1}x$

$$y' = \overset{f}{\cancel{(1+x^2)}} \cdot \overset{g'}{\frac{1}{\cancel{(1+x^2)}}} + \overset{f'}{2x} \cdot \overset{g}{\tan^{-1}x}$$

$$y' = 1 + 2x\tan^{-1}x$$

(4) $y = \sin^{-1}(x) + \cos^{-1}\left(\sqrt{1-x^2}\right)$, where $\sqrt{1-x^2} = (1-x^2)^{1/2}$

$$y' = \frac{1}{\sqrt{1-x^2}} - \frac{1}{\sqrt{1-\left(\sqrt{1-x^2}\right)^2}} \cdot \cancel{\tfrac{1}{2}}(1-x^2)^{-1/2} \cdot (-\cancel{2}x)$$

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

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

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

why abs value?

$\sqrt{x^2} = \pm x$

but x^2 is always +ve

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

(5) $y = \sin\left(\sin^{-1}(x^2)\right)$

$$y' = \cos\left(\sin^{-1}(x^2)\right) \cdot \frac{1}{\sqrt{1-(x^2)^2}} \cdot 2x$$

$$y' = \frac{2x\cos\left(\sin^{-1}(x^2)\right)}{\sqrt{1-x^4}}$$ tada!

<u>We have now finished Ch7</u>

Ch 6/7 Test is a
WEEK TODAY!
Thursday May 9th ☺