$$\frac{d}{dx}\left[\sin^{-1}x\right] =$$

$$\frac{d}{dx}\left[\sin^{-1}(AT)\right] =$$

AT = Anything

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

$$\frac{d}{dx}\left[\sin^{-1}(AT)\right] = \frac{1}{\sqrt{1-(AT)^2}} \cdot \frac{d}{dx}\left[AT\right]$$

$$\frac{d}{dx}\left[\tan^{-1}x\right] =$$

$$\frac{d}{dx}\left[\tan^{-1}(AT)\right] =$$

AT = Anything

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

$$\frac{d}{dx}\left[\tan^{-1}(AT)\right] = \frac{1}{(AT)^2+1} \cdot \frac{d}{dx}\left[AT\right]$$

$$\frac{d}{dx}\left[\sec^{-1}x\right] =$$

$$\frac{d}{dx}\left[\sec^{-1}(AT)\right] =$$

AT = Anything

$$\frac{d}{dx}\left[\sec^{-1}(x)\right] = \frac{1}{|x|\sqrt{x^2-1}}$$

$$\frac{d}{dx}\left[\sec^{-1}(AT)\right] = \frac{1}{|AT|\sqrt{(AT)^2-1}} \cdot \frac{d}{dx}\left[AT\right]$$

$$\frac{d}{dx}\left[\cos^{-1}(x)\right]=$$

$$\frac{d}{dx}\left[\cos^{-1}(AT)\right]=$$

AT= Anything

$$\frac{d}{dx}\left[\cos^{-1}(x)\right]=\frac{-1}{\sqrt{1-x^2}}$$

$$\frac{d}{dx}\left[\cos^{-1}(AT)\right]=\frac{-1}{\sqrt{1-(AT)^2}}\cdot\frac{d}{dx}\left[AT\right]$$

$$\frac{d}{dx}\left[\cot^{-1}x\right]=$$

$$\frac{d}{dx}\left[\cot^{-1}(AT)\right]=$$

AT= Anything

$$\frac{d}{dx}\left[\cot^{-1}x\right]=\frac{-1}{x^2+1}$$

$$\frac{d}{dx}\left[\cot^{-1}(AT)\right]=\frac{-1}{(AT)^2+1}\cdot\frac{d}{dx}\left[AT\right]$$

$$\frac{d}{dx}\left[\csc^{-1}x\right]=$$

$$\frac{d}{dx}\left[\csc^{-1}(AT)\right]=$$

AT= Anything

$$\frac{d}{dx}\left[\csc^{-1}(x)\right]=\frac{-1}{|x|\sqrt{x^2-1}}$$

$$\frac{d}{dx}\left[\csc^{-1}(AT)\right]=\frac{-1}{|AT|\sqrt{(AT)^2-1}}\cdot\frac{d}{dx}\left[AT\right]$$

Inverse Derivatives

$$\frac{d}{dx}\left[f^{-1}(x)\right] =$$

$$\frac{d}{dx}\left[f^{-1}(AT)\right] =$$

AT = Anything

$$\frac{d}{dx}\left[f^{-1}(x)\right] = \frac{1}{f'\left[f^{-1}(x)\right]}$$

$$\frac{d}{dx}\left[f^{-1}(AT)\right] = \frac{1}{f'\left[f^{-1}(AT)\right]} \cdot \frac{d}{dx}\left[AT\right]$$

Find:

$$\frac{d}{dx}\left[\sin^{-1}(x^2)\right]$$

$$\frac{d}{dx}\left[\sin^{-1}(x^2)\right]$$

$$= \frac{1}{\sqrt{1-(x^2)^2}} \cdot \frac{d}{dx}\left[x^2\right]$$

$$= \frac{1}{\sqrt{1-x^4}} \cdot 2x = \frac{2x}{\sqrt{1-x^4}}$$

Remember $\frac{d}{dx}\left[\sin^{-1}(AT)\right] = \frac{1}{\sqrt{1-(AT)^2}} \cdot \frac{d}{dx}\left[AT\right]$

Find:

$$\frac{d}{dx}\left[\tan^{-1}(3x^2)\right]$$

$$\frac{d}{dx}\left[\tan^{-1}(3x^2)\right] = \frac{1}{(3x^2)^2+1} \cdot \frac{d}{dx}\left[3x^2\right]$$

$$= \frac{1}{9x^4+1} \cdot 6x$$

$$= \frac{6x}{9x^4+1}$$

Remember: $\frac{d}{dx}\left[\tan^{-1}(AT)\right] = \frac{1}{(AT)^2+1} \cdot \frac{d}{dx}\left[AT\right]$

$G(x) = \sqrt{1-x^2} \cdot \arccos x$

Find $G'(x)$

$G(x) = \sqrt{1-x^2} \cdot \arccos x$. Product

$G'(x) = \sqrt{1-x^2} \cdot \frac{d}{dx}[\arccos x] + \arccos x \cdot \frac{d}{dx}[(1-x^2)^{1/2}]$

$G'(x) = \cancel{\sqrt{1-x^2}} \cdot \frac{(-1)}{\cancel{\sqrt{1-(x)^2}}} \cdot (1) + \arccos x \cdot \frac{1}{\cancel{2}}(1-x^2)^{-1/2} \cdot (-\cancel{2}x)$

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

Remember
$\arccos x = \cos^{-1}(x)$

Remember: $\frac{d}{dx}[\cos^{-1}(AT)] = \frac{-1}{\sqrt{1-(AT)^2}} \cdot \frac{d}{dx}[AT]$