Inverse Trigonometric Function Differentiation

Derivatives of Inverse Trigonometric Functions

Function	Derivative
$f(x)=\sin^{-1}x \Rightarrow f'(x)=\frac{1}{\sqrt{1-x^2}}$	$f(x)=\sin^{-1}[k(x)] \Rightarrow f'[k(x)]=\frac{[k'(x)]}{\sqrt{1-[k(x)]^2}}$
$f(x)=\cos^{-1}x \Rightarrow f'(x)=\frac{-1}{\sqrt{1-x^2}}$	$f(x)=\cos^{-1}[k(x)] \Rightarrow f'[k(x)]=\frac{-[k'(x)]}{\sqrt{1-[k(x)]^2}}$
$f(x)=\tan^{-1}x \Rightarrow f'(x)=\frac{1}{1+x^2}$	$f(x)=\tan^{-1}[k(x)] \Rightarrow f'[k(x)]=\frac{[k'(x)]}{1+[k(x)]^2}$
$f(x)=\cot^{-1}x \Rightarrow f'(x)=\frac{-1}{1+x^2}$	$f(x)=\cot^{-1}[k(x)] \Rightarrow f'[k(x)]=\frac{-[k'(x)]}{1+[k(x)]^2}$
$f(x)=\sec^{-1}x \Rightarrow f'(x)=\frac{1}{\lvert x\rvert\sqrt{x^2-1}}$	$f(x)=\sec^{-1}[k(x)] \Rightarrow$ $f'[k(x)]=\frac{[k'(x)]}{\lvert[k(x)]\rvert\sqrt{[k(x)]^2-1}}$
$f(x)=\csc^{-1}x \Rightarrow f'(x)=\frac{-1}{\lvert x\rvert\sqrt{x^2-1}}$	$f(x)=\csc^{-1}[k(x)] \Rightarrow f'(x)=\frac{-[k'(x)]}{\lvert[k(x)]\rvert\sqrt{[k(x)]^2-1}}$

Example 1: Differentiate:

1) $y=\arcsin x^4$

$$y=\arcsin x^4$$
$$\frac{dy}{dx}=\frac{1}{\sqrt{1-x^8}}\cdot 4x^3$$

2) $y=\arctan x^3$

$$y=\arctan x^3$$
$$\frac{dy}{dx}=\frac{1}{1+x^6}\cdot 3x^2$$