Calculus BC

Section 5.6 - Inverse Trigonometric Functions - Differentiation

Obj: - To find the derivative of inverse trig functions.

Review:

Domain and Range

$y = \sin^{-1} x$ Domain: Range:	$y = \cos^{-1} x$ Domain: Range:
$y = \tan^{-1} x$ Similar to $y = \sin^{-1} x$	$y = \cot^{-1} x$ Similar to $y = \cos^{-1} x$
$\csc^{-1} x = \sin^{-1}\left(\frac{1}{x}\right)$	$\sec^{-1} x = \cos^{-1}\left(\frac{1}{x}\right)$

a) evaluate $\sin^{-1}\left(\frac{\sqrt{3}}{2}\right)$

b) evaluate $\sec^{-1}\left(\frac{-2}{\sqrt{3}}\right)$

c) evaluate $\tan\left[\cos^{-1}\left(\frac{x+1}{\sqrt{2x^2+2}}\right)\right]$

$\frac{d}{dx}\sin^{-1}u=\frac{1}{\sqrt{1-u^2}}\cdot\frac{du}{dx}$	$\frac{d}{dx}\cos^{-1}u=-\frac{1}{\sqrt{1-u^2}}\cdot\frac{du}{dx}$
$\frac{d}{dx}\tan^{-1}u=\frac{1}{1+u^2}\cdot\frac{du}{dx}$	$\frac{d}{dx}\cot^{-1}u=-\frac{1}{1+u^2}\cdot\frac{du}{dx}$
$\frac{d}{dx}\sec^{-1}u=\frac{1}{\lvert u\rvert\sqrt{u^2-1}}\cdot\frac{du}{dx}$	$\frac{d}{dx}\csc^{-1}u=-\frac{1}{\lvert u\rvert\sqrt{u^2-1}}\cdot\frac{du}{dx}$

$|u|>1$ for $\sec^{-1}$ and $\csc^{-1}$

1. Show that $\frac{d}{dx}\sin^{-1}x = \frac{1}{\sqrt{1-x^2}}$

Let $y = \sin^{-1}x$

-rewrite without the inverse

-differentiate implicitly

-solve for $\frac{dy}{dx}$

2. $y = \ln\left(x^2+4\right) - x\tan^{-1}\left(\frac{x}{2}\right)$, find $\frac{dy}{dx}$