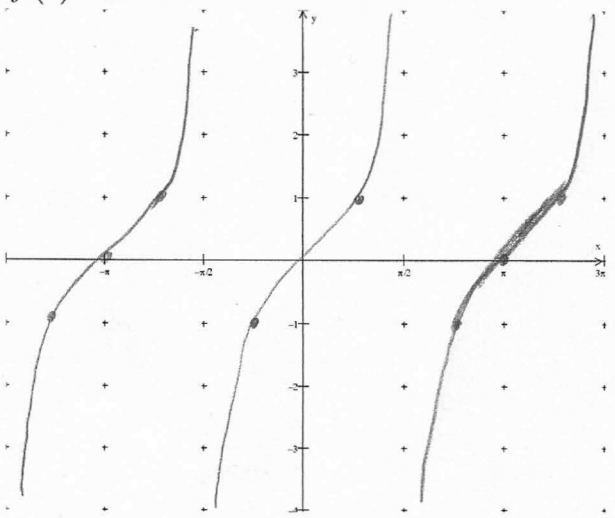
Magnet Analysis 1A
Rose

Name KEY

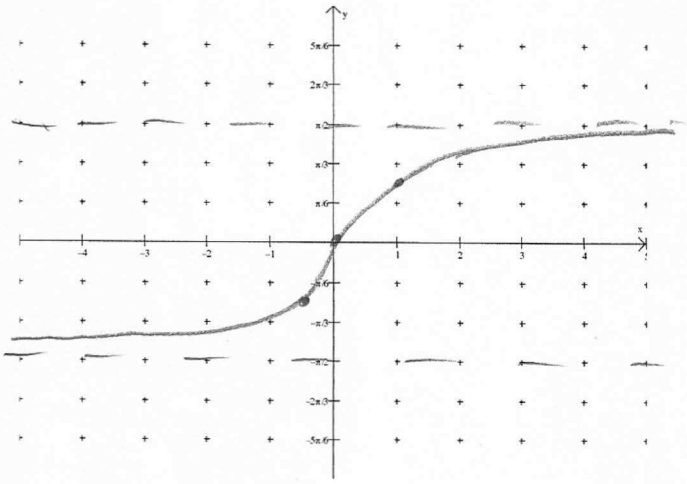
Derivatives of Inverse Trigonometric Functions

$\frac{d}{dx}[\arctan x] =$

$f(x) = \tan x$



$f^{-1}(x) = \arctan x$



$y = \arctan x$

$\tan y = x$

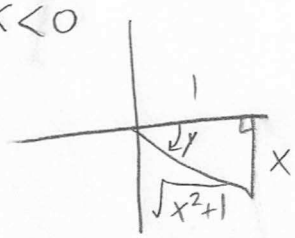
$\frac{d}{dx}[\tan y] = \frac{d}{dx}[x]$

$\sec^2 y \frac{dy}{dx} = 1$

$\frac{dy}{dx} = \cos^2 y$

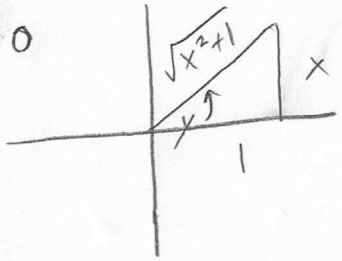
$\boxed{\frac{dy}{dx} = \frac{1}{x^2+1}}$

$x < 0$



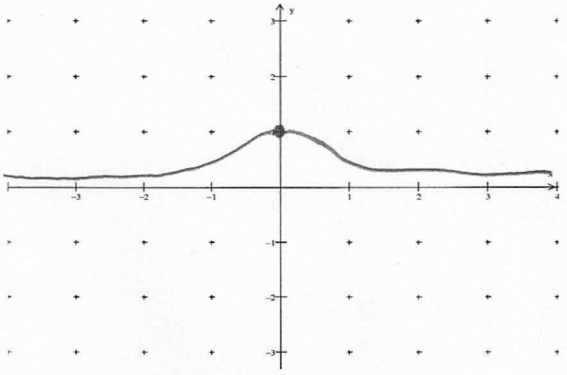
$\cos^2 y = \frac{1}{x^2+1}$

$x > 0$

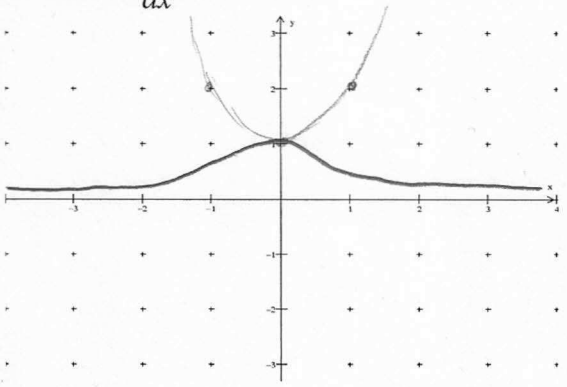


$\cos^2 y = \frac{1}{x^2+1}$

Sketch of guess for $\frac{d}{dx}[\arctan x]$

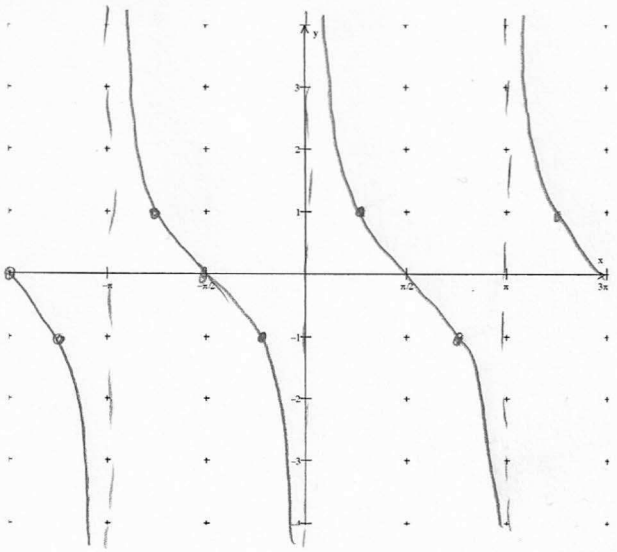


Sketch of $\frac{d}{dx}[\arctan x]$

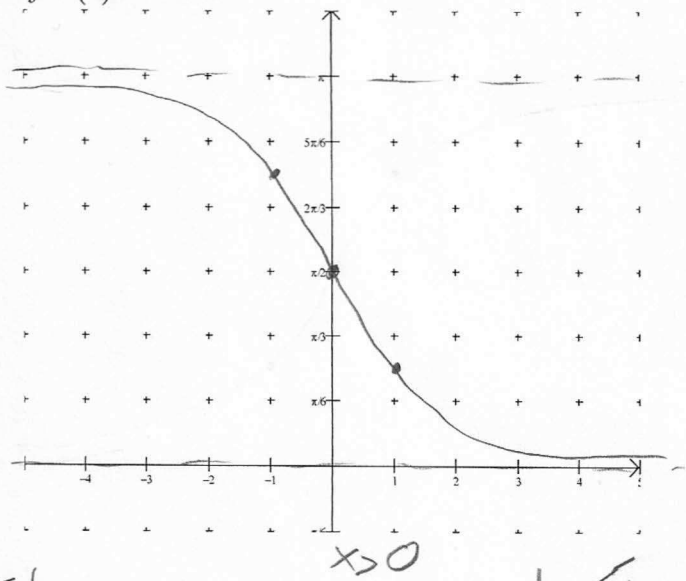


$\frac{d}{dx}[arc\cot x] =$

$f(x) = \cot x$



$f^{-1}(x) = \operatorname{arc}\cot x$



$y = \operatorname{arc}\cot x$

$\cot y = x$

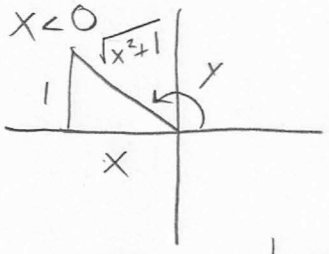
$\frac{d}{dx}[\cot y] = \frac{d}{dx}[x]$

$-\csc^2 y \cdot \frac{dy}{dx} = 1$

$\frac{dy}{dx} = -\sin^2 y$

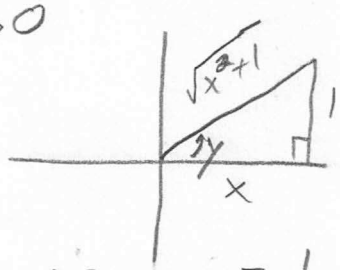
$\boxed{\frac{dy}{dx} = \frac{-1}{x^2+1}}$

$x < 0$



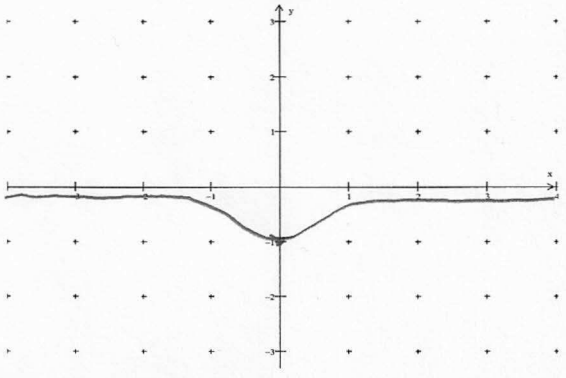
$-\sin^2 y = -\frac{1}{x^2+1}$

$x > 0$

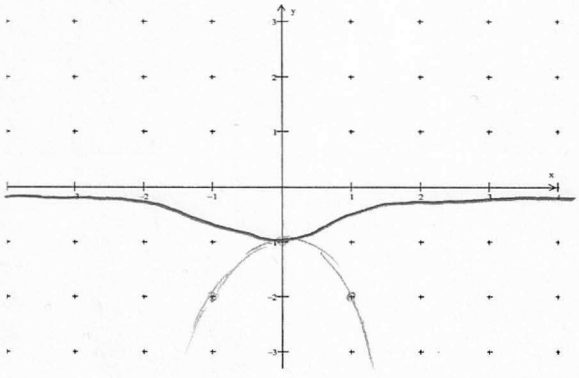


$-\sin^2 y = -\frac{1}{x^2+1}$

Sketch of guess for $\frac{d}{dx}[\operatorname{arc}\cot x]$

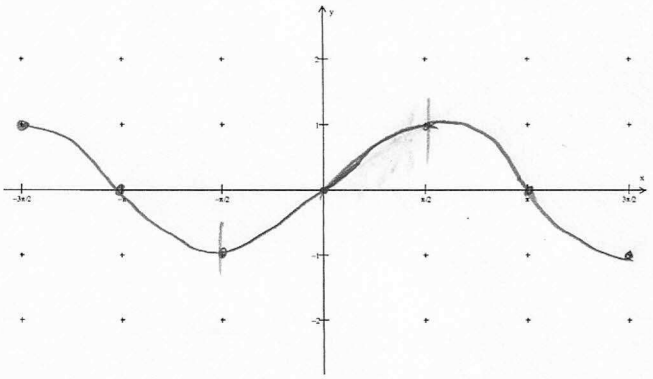


Sketch of $\frac{d}{dx}[arc\cot x]$

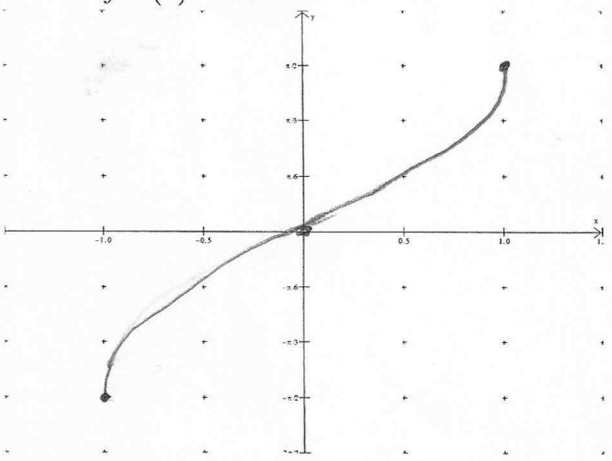


$\frac{d}{dx}[\arcsin x] =$

$f(x) = \sin x$



$f^{-1}(x) = \arcsin x$



$y = \arcsin x$

$\sin y = x$

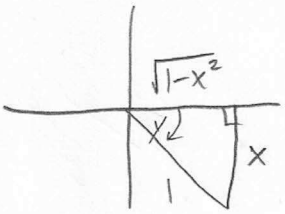
$\frac{d}{dx}[\sin y] = \frac{d}{dx}[x]$

$\cos y \cdot \frac{dy}{dx} = 1$

$\frac{dy}{dx} = \sec y$

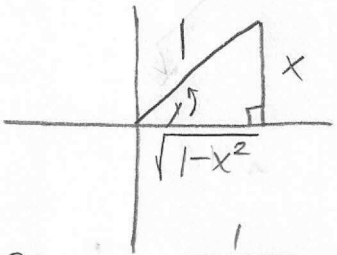
$\boxed{\frac{dy}{dx} = \frac{1}{\sqrt{1-x^2}}}$

$x < 0$



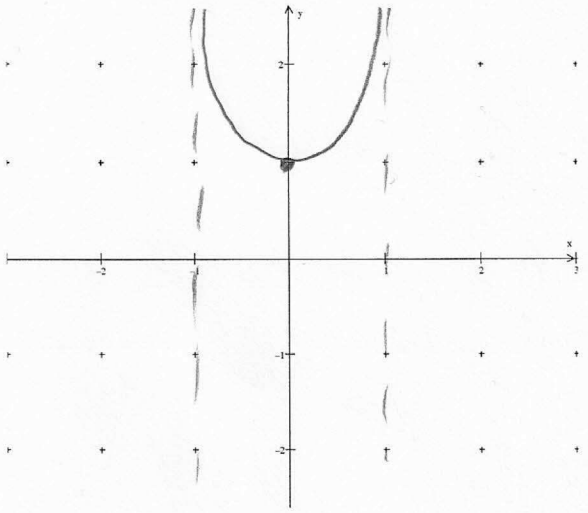
$\sec y = \frac{1}{\sqrt{1-x^2}}$

$x > 0$

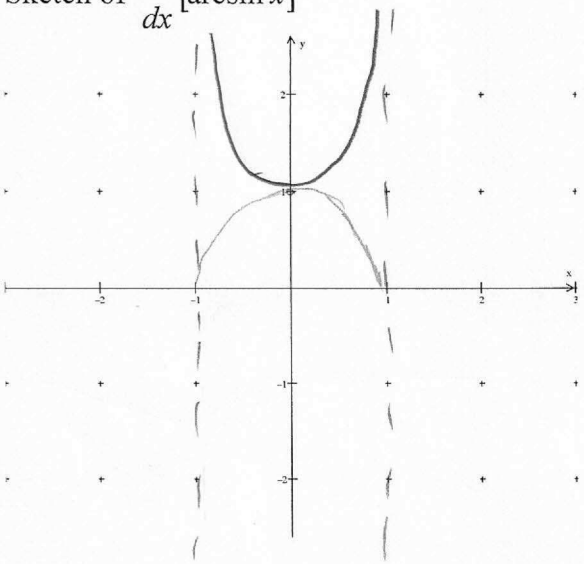


$\sec y = \frac{1}{\sqrt{1-x^2}}$

Sketch of guess of $\frac{d}{dx}[\arcsin x]$

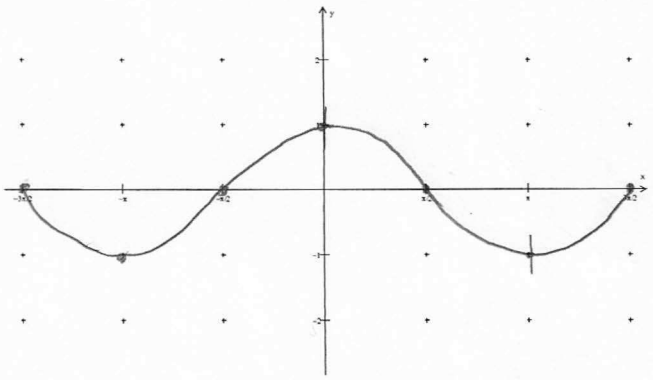


Sketch of $\frac{d}{dx}[\arcsin x]$

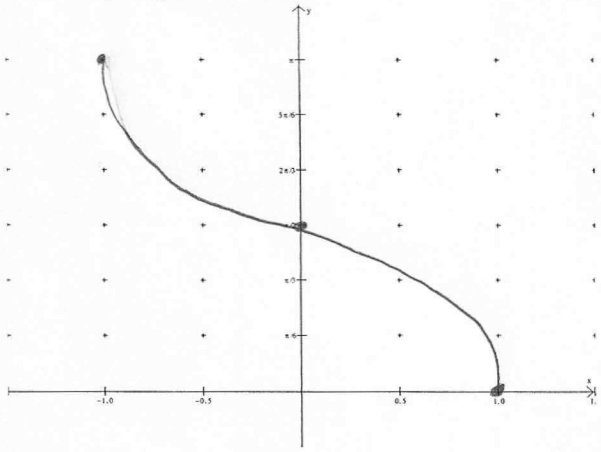


$\frac{d}{dx}[\arccos x] =$

$f(x) = \cos x$



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



$y = \arccos x$

$\cos y = x$

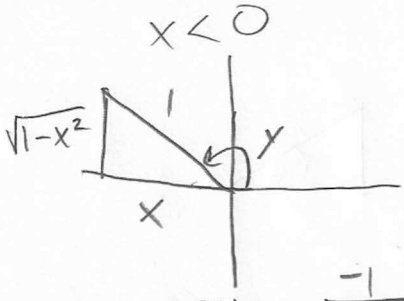
$\frac{d}{dx}[\cos y] = \frac{d}{dx}[x]$

$-\sin y \cdot \frac{dy}{dx} = 1$

$\frac{dy}{dx} = -\csc y$

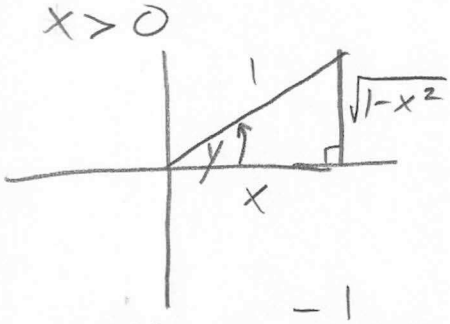
$\boxed{\frac{dy}{dx} = \frac{-1}{\sqrt{1-x^2}}}$

$x < 0$



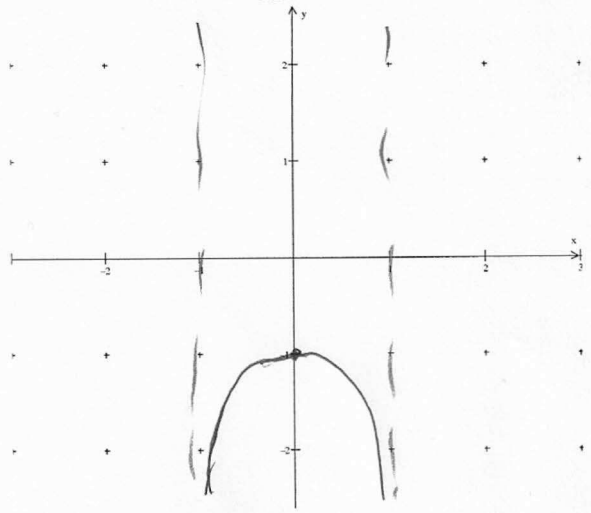
$-\csc y = \frac{-1}{\sqrt{1-x^2}}$

$x > 0$

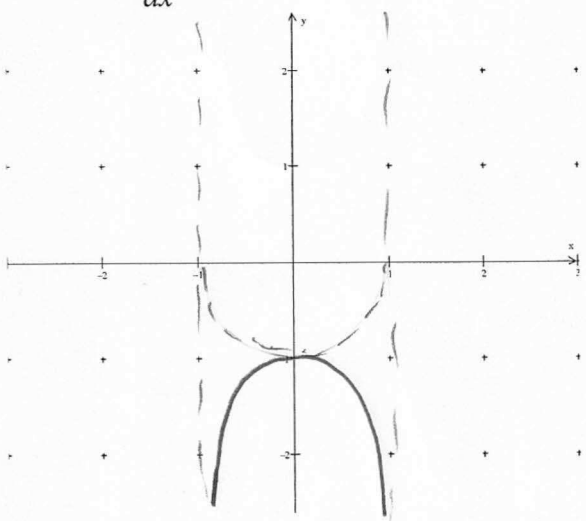


$-\csc y = \frac{-1}{\sqrt{1-x^2}}$

Sketch of guess of $\frac{d}{dx}[\arccos x]$

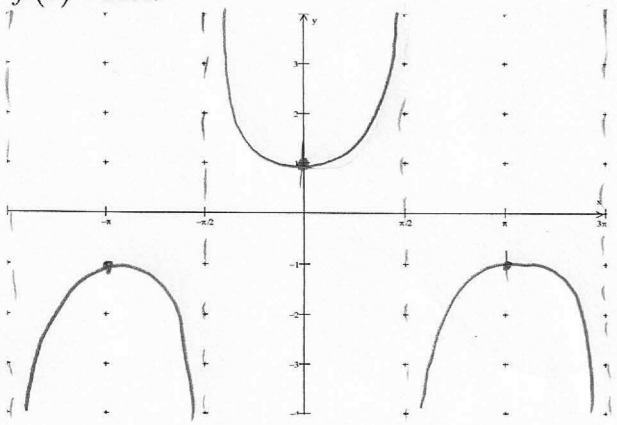


Sketch of $\frac{d}{dx}[\arccos x]$

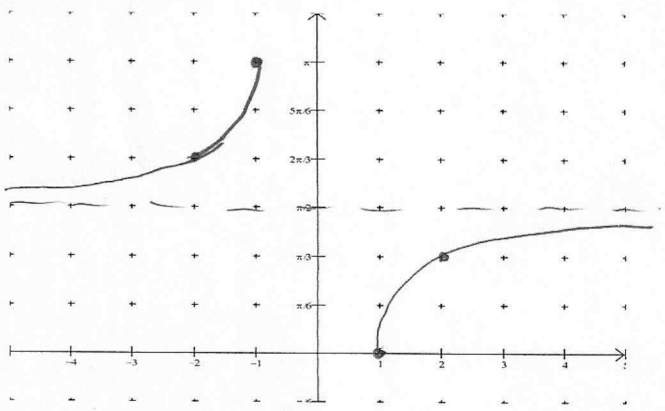


$\frac{d}{dx}[\operatorname{arc\,sec} x] =$

$f(x) = \sec x$



$f^{-1}(x) = \operatorname{arc\,sec} x$



$y = \operatorname{arc\,sec} x$

$\sec y = x$

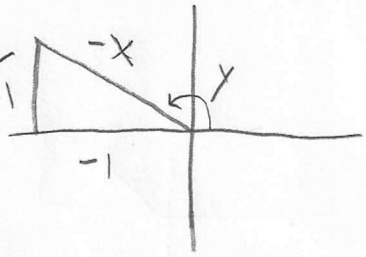
$\frac{d}{dx}[\sec y] = \frac{d}{dx}[x]$

$\sec y \tan y \cdot \frac{dy}{dx} = 1$

$\frac{dy}{dx} = \cos y \cot y$

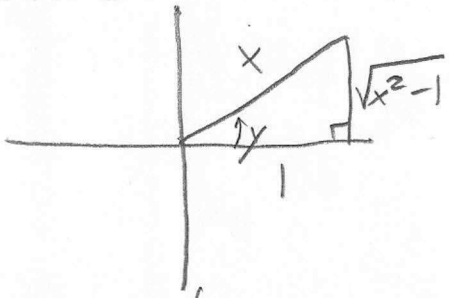
$\boxed{\frac{dy}{dx} = \frac{1}{|x|\sqrt{x^2-1}}}$

$x < 0$



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

$x > 0$

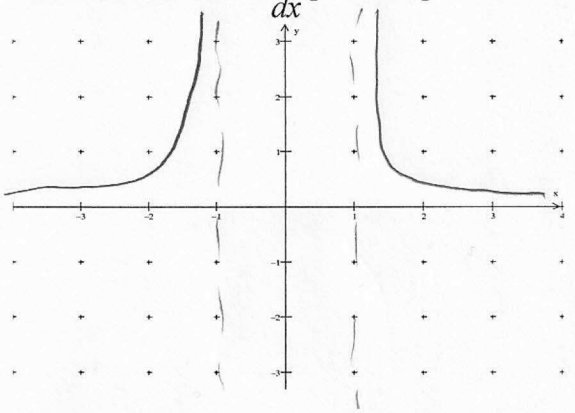


$\cos y \cot y = \frac{1}{x} \cdot \frac{1}{\sqrt{x^2-1}}$

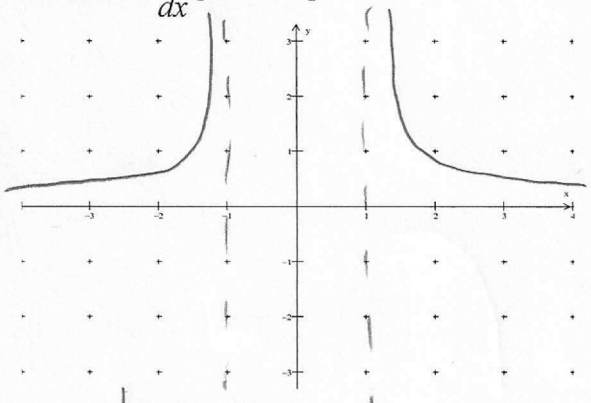
$$\cos y \cot y = \begin{cases} \frac{-1}{x\sqrt{x^2-1}}, & x < 0 \\ \frac{1}{x\sqrt{x^2-1}}, & x > 0 \end{cases}$$

$$\cos y \cot y = \frac{1}{|x|\sqrt{x^2-1}}$$

Sketch of guess for $\frac{d}{dx}[\operatorname{arc\,sec} x]$



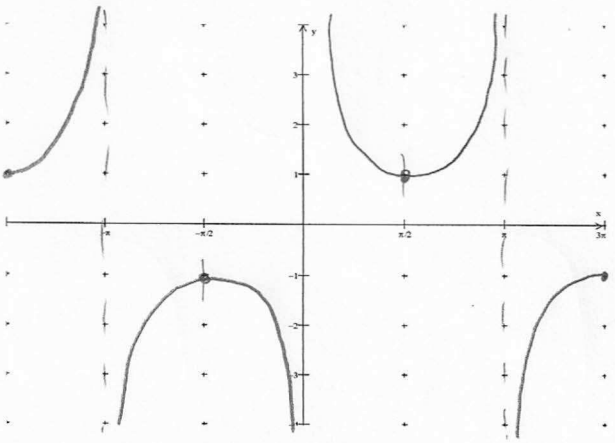
Sketch of $\frac{d}{dx}[\operatorname{arc\,sec} x]$



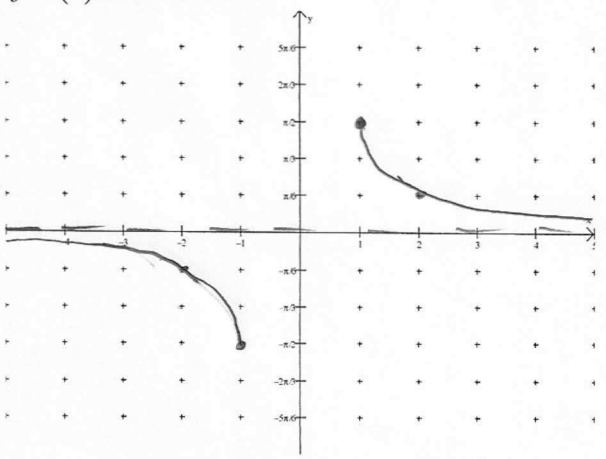
$\lim_{x \to \pm\infty} \frac{1}{|x|\sqrt{x^2-1}} \approx \frac{1}{x^2} = 0^+$

$\frac{d}{dx}[\operatorname{arc\,csc} x] =$

$f(x) = \csc x$



$f^{-1}(x) = \operatorname{arc\,csc} x$



$y = \operatorname{arc\,csc} x$

$\csc y = x$

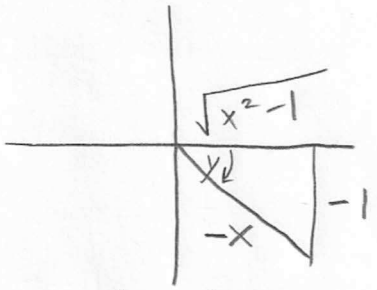
$\frac{d}{dx}[\csc y] = \frac{d}{dx}[x]$

$-\csc y \cot y \frac{dy}{dx} = 1$

$\frac{dy}{dx} = -\sin y \tan y$

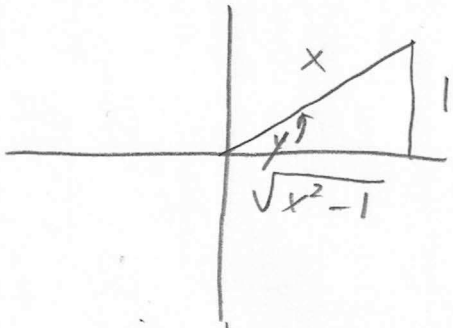
$\boxed{\frac{dy}{dx} = \frac{-1}{|x|\sqrt{x^2-1}}}$

$x < 0$



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

$x > 0$

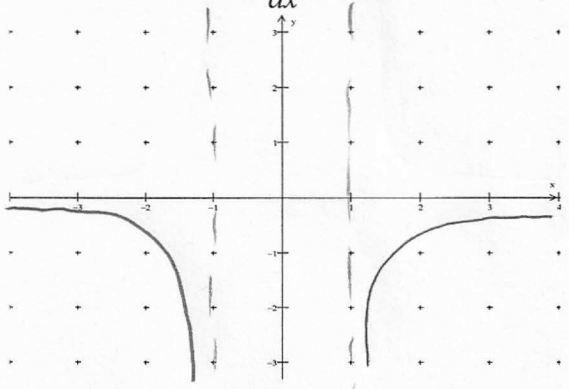


$-\sin y \tan y = -\frac{1}{x} \cdot \frac{1}{\sqrt{x^2-1}}$

$-\sin y \tan y = \begin{cases} \frac{1}{x\sqrt{x^2-1}}, & x < 0 \\ \frac{-1}{x\sqrt{x^2-1}}, & x > 0 \end{cases}$

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

Sketch of guess for $\frac{d}{dx}[\operatorname{arc\,csc} x]$



Sketch of $\frac{d}{dx}[\operatorname{arc\,csc} x]$