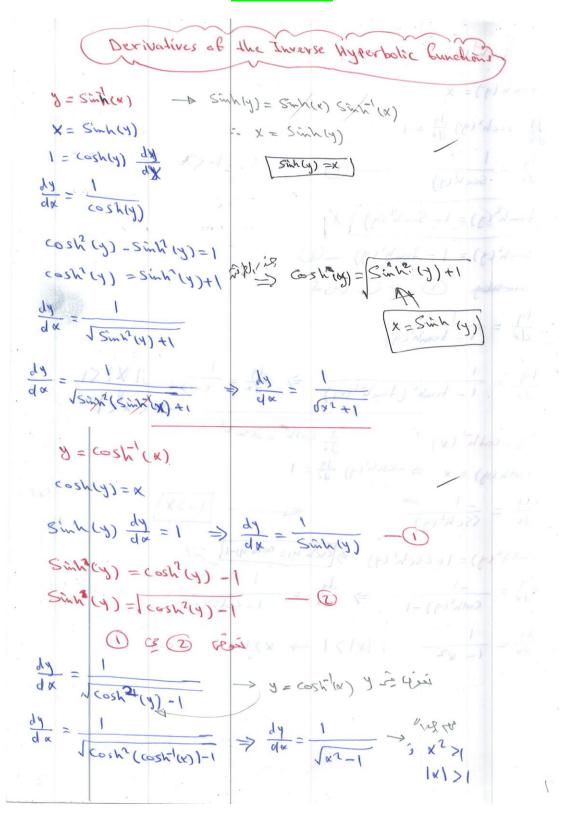
## Derivatives and Integrals of the Inverse Hyperbolic Functions



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

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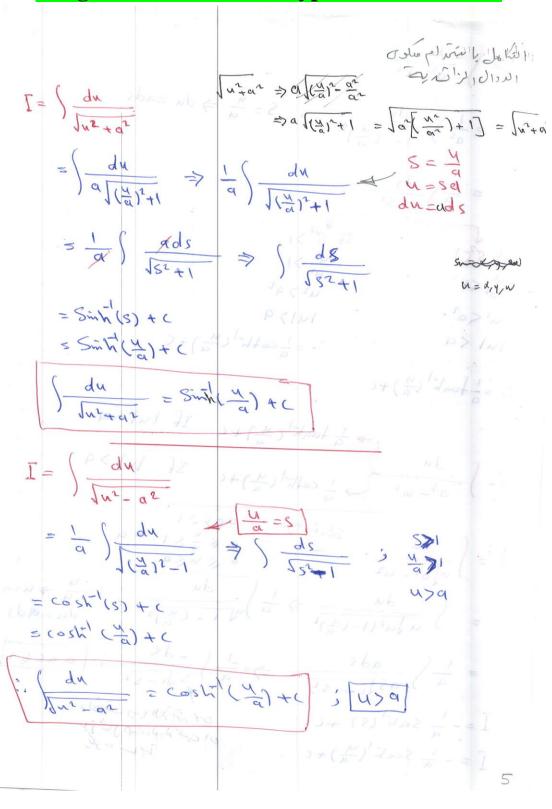
Sech'(y) = 1 - 1 cmh'(y) - (2)

Sechly () = 1 - 1 cmh'(y)

$$\frac{dy}{dx} = \frac{1}{1 - \frac{$$

Seek(g) = 
$$x$$
  $\Rightarrow$  -Seek(g) tunkers)  $\frac{dg}{dx} = 1$ 
 $\frac{dg}{dx} = \frac{-1}{\text{Seek(g)}} \frac{1}{\text{Seek(g)}} \frac{1}{\text$ 

## **Integrals of the Inverse Hyperbolic Functions**



 $I = \begin{cases} du \\ d^2 u^2 \end{cases}$  $=\frac{1}{a^2}\int_{-\infty}^{\infty} du = ads$  $=\frac{1}{9}\left(\frac{ds}{1-s^2}\right)\frac{ds}{1+\frac{(\frac{\mu}{2})}{s}}\left(\frac{1}{p}\right)\left(\frac{\mu}{p}\right)$ or 42 <1 := = 1 tonk (4)+c of du sathly to It hall and =  $\int \frac{du}{u \int a^2 (1-i\frac{\pi}{2})^2} \Rightarrow \frac{1}{a} \int \frac{du}{u \int 1-(\frac{\pi}{a})^2} \Rightarrow S = \frac{u}{a} \Rightarrow u = 0.5$  $=\frac{1}{a}\int \frac{ads}{asl_1-s^2} \Rightarrow =\frac{1}{a}\int \frac{-ds}{sd_1-s^2}; \quad orselven$ I = - \frac{1}{a} \text{Sech}^2(S) + C

\[ \text{Or } \times \text{N} \text{N} \text{(-) cises } \\
\text{I} = - \frac{1}{a} \text{Sech}^2(\frac{1}{a}) + C

\]

\[ \text{Or } \text{N} \text{N}

$$I = \int \frac{du}{u \int a^{2} + u^{2}}$$

$$= \frac{1}{a} \int \frac{du}{u \int 1 + (\frac{u}{a})^{2}}$$

$$= \frac{1}{a} \int \frac{ads}{as \int 1 + s^{2}}$$

$$= \frac{1}{a} \int \frac{-ds}{s \int 1 + s^{2}}$$

$$= \frac{1}{a} \left( sch^{2}(\frac{u}{a}) + c \right)$$

$$= \frac{1}{a} \left( sch^{2}(\frac{$$

$$\int \frac{1}{\sqrt{4x^2 - 1}} dx = \int \frac{1}{2\sqrt{u^2 - 1}} du$$
$$= \frac{1}{2} \cosh^{-1} u + C$$
$$= \frac{1}{2} \cosh^{-1} (2x) + C.$$

$$\begin{split} \int \frac{1}{2x\sqrt{1-9x^2}} dx &= \frac{1}{2} \int \frac{1}{u\sqrt{1-u^2}} du \\ &= -\frac{1}{2} \mathrm{sech}^{-1} |u| + C \\ &= -\frac{1}{2} \mathrm{sech}^{-1} |3x| + C \end{split}$$

$$\int \frac{1}{\sqrt{x^2-4}} dx = \cosh^{-1}(\frac{x}{2}) + C$$

$$\int rac{1}{\sqrt{1-e^{2x}}} dx = -\mathrm{sech}^{-1}(e^x) + C$$

$$\int_0^1 \frac{2 \, dx}{\sqrt{3 + 4x^2}} = \sinh^{-1} \left( \frac{2x}{\sqrt{3}} \right) \Big|_0^1 = \sinh^{-1} \left( \frac{2}{\sqrt{3}} \right) - \sinh^{-1} (0)$$
$$= \sinh^{-1} \left( \frac{2}{3} \right) - 0 \approx 0.98665.$$