Author 1 _____

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# 15 – Inverse Trig & Logs

**Theorem: Derivatives of the Inverse Trigonometric Functions**

- $(\arcsin x)' = (\sin^{-1} x)' = \dfrac{1}{\sqrt{1-x^2}}$
- $(\arccos x)' = (\cos^{-1} x)' = -\dfrac{1}{\sqrt{1-x^2}}$
- $(\arctan x)' = (\tan^{-1} x)' = \dfrac{1}{1+x^2}$
- $(\operatorname{arccot} x)' = (\cot^{-1} x)' = -\dfrac{1}{1+x^2}$
- $(\operatorname{arcsec} x)' = (\sec^{-1} x)' = \dfrac{1}{x\sqrt{x^2-1}}$
- $(\operatorname{arccsc} x)' = (\csc^{-1} x)' = -\dfrac{1}{x\sqrt{x^2-1}}$

**Theorem: Derivatives of Logarithmic Functions**

- $(\ln x)' = \dfrac{1}{x}$
- $(\ln |x|)' = \dfrac{1}{x}$
- $(\log_a x)' = \dfrac{1}{x \ln a}$

**1.** Find the derivative.

**(a)** $y = \dfrac{\arcsin(1-x)}{\ln(x^5)}$

**(b)** $y = \ln\left(\arctan(x^3)\log_3(x)\right)$

**(c)** $e^{2x}y = \ln(y^3)$

**2.** Consider the function $f(x) = x^{\sin x}$.

**(a)** A classmate tells you that $f'(x) = (\sin x)x^{(\sin x)-1}$. What are they thinking? What is the error?

**(b)** Find $f'(x)$ by using **logarithmic differentiation**.