

# DERIVATIVES INVOLVING LOGARITHMS

DERIVATIVE RULE (FOR LOGARITHMIC FUNCTIONS)

$$\frac{d}{dx} \ln(x) = \frac{1}{x}$$

$$\frac{d}{dx} \log_a(x) = \frac{1}{x \cdot \ln(a)}$$

Ex. Compute  $f'(x)$  given that  $f(x) = \ln(e^{-x} + x)$

$f(x) = \ln(e^{-x} + x)$  is a composition of functions, so we'll use chain rule.

$$h(x) = \text{OUTSIDE} = \ln(x) \quad h'(x) = \frac{1}{x}$$

$$g(x) = \text{INSIDE} = e^{-x} + x \quad g'(x) = -e^{-x} + 1$$

so  $f'(x) = h'(g(x)) \cdot g'(x)$  by CHAIN RULE

$$f'(x) = \left( \frac{1}{e^{-x} + x} \right) (-e^{-x} + 1)$$

→ Complete "Derivative Rules" worksheet.

‡ Practice problems