

**A. Derivatives**

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

$$2.) \frac{d}{dx}(\ln x) = \frac{1}{x}$$

$$3.) \frac{d}{dx}(a^x) = a^x \cdot \ln a$$

$$4.) \frac{d}{dx}(e^x) = e^x$$

Examples: Find the derivative of each

$$1.) f(x) = \ln(x^3 + 10)$$

$$2.) y = e^{-5x} \cdot \cos(3x)$$

$$3.) f(x) = \ln\left(\sqrt{\frac{4x-6}{x+1}}\right)$$

$$4.) f(x) = 3x^6 \cdot e^{2x}$$

$$5.) f(x) = \log_3(5x^2 + 4)$$

$$6.) f(x) = 7^{5x}$$

## B. Logarithmic Differentiation

Examples: Find the derivative of each

1.)  $y = x^{\sqrt{x}}$

2.)  $y = \frac{(9x+4)^7(x^3-5)^3}{\sqrt{3x-1}}$