Derivatives of Logarithmic Functions

Log (Base a) | $y = \log_a f(x)$ | $y' = \dfrac{f'(x)}{f(x)\ln a}$

Examples:

1. $y = \log_3 x$
2. $y = \log_{10} x^2$
3. $y = \log_7(x^3 - 4x^2)$

Ln (Base e) | $y = \ln f(x)$ | $y' = \dfrac{f'(x)}{f(x)}$

Examples:

4. $y = \ln x$
5. $y = \ln(x^3 + 1)$
6. $y = \ln(\sin x)$
7. $y = \sqrt{\ln x}$

Finding Derivatives By Using Properties of Logarithms.

Procedure:

1. Apply the natural logarithm to both sides of the equation.
2. Use the properties of logarithms to:
   a) expand the expression
   b) remove "x" from the exponent
3. Find the derivative.
4. Simplify

Examples:

8. $y = x^{5x}$

9. $f(x) = x^{\sin x}$

10. $y = \ln\left[\dfrac{x+1}{\sqrt{x-2}}\right]$

Homework: page 252 / 2-16 all, 29, 31, 33, 35