

5.1B: Combinations of derivative rules

$$\text{Given } f(x) = \ln(u) \text{ then } f'(x) = \frac{1}{u} du \text{ or } f'(x) = \frac{du}{u}$$

Apply this formula along with the product rule, quotient rule, chain rule, constant multiple rule, and properties of logarithms to determine the derivative of the following functions. Simplify where appropriate.

1) $f(x) = \ln(x^3)$

2) $f(x) = (\ln x)^3$

3) $f(x) = x^3 \ln(x)$

4) $f(x) = \frac{\ln(x)}{x}$

5) $f(x) = x^2 \ln\left(\frac{x}{4}\right)$

6) $f(x) = \ln\left(\sqrt{2 + \cos^2 x}\right)$

Review: Applications of derivatives of natural log functions.

7) Discuss the relative extrema, concavity, and points of inflection over the interval $(0, \infty)$ of the function, $f(x) = \ln(x^2) - 2$

8) Write the equation of the line tangent to the function in problem 7 at the point $(1, -2)$.

9) Discuss the relative extrema, concavity, and points of inflection over the interval $(0, \infty)$ of the function, $f(x) = x^2 \ln\left(\frac{x}{4}\right)$. Check your results on your graphing calculator.

Homework 5.1B: problems 41, 53, 55, 65, 71a, 77, 83, 85