

Due date: _____

Name: _____

Getting Ready for Derivatives (Part 4)

Notes

Recall the following properties of logarithms:

$$\log_a(AB) = \log_a A + \log_a B$$

$$\log_a\left(\frac{A}{B}\right) = \log_a A - \log_a B$$

$$\log_a A^C = C \log_a A$$

(Note: A and B must be positive)

ex: Expand $\log_5 \frac{\sqrt[3]{x}}{25y^3}$

ex: Expand $\ln\left(\frac{3x^2+15x+18}{e^5 \cdot \sqrt[3]{x} \cdot (2x+1)^3}\right)$

1. Expand each of the following expressions using the properties of logarithms.

a) $\ln\left(\frac{(x+1)\sqrt{2x-3}}{x^2-x-2}\right)$

$$\text{b) } \ln\left(\sqrt{\frac{x(x-1)}{x^2+2}}\right)$$

$$\text{c) } \ln\left(e^5 \cdot \sqrt[3]{x} \cdot (2x^2 - 9x - 5)\right)$$

Practice at home

2. Expand each of the following expressions using the properties of logarithms.

$$\text{a) } \log\left(\frac{x}{\sqrt[3]{1-x}}\right)$$

$$\text{b) } \ln x^{\sqrt{x+1}}$$

$$\text{c) } \log_2 \frac{x^3}{3(y-1)(z+2)^2}$$

$$d) \log_3 \frac{x^3+x^2}{x^2-4}$$

$$e) \log \sqrt{\frac{10x^2-10x-60}{(x+1)^7}}$$

$$f) \ln \left(\frac{\sqrt{x} \cos^{-1} x}{2^x(x+1)} \right)$$

$$g) \ln \left(\frac{\sqrt[4]{x} \cdot (2x^3+1)^2}{e^{\tan^{-1} x}} \right)$$

3. Determine whether each statement is true or false.

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

b) $\log x^2 = 2 \log x$

c) $\ln \sqrt{x} = \frac{1}{2} \ln x$

d) $\ln \frac{x}{yz} = \ln x - \ln y + \ln z$

e) $\sqrt[4]{\log x} = \frac{1}{4} \log x$