

WS 1 - Derivatives of LOGS
Calculus AB - Harter

Use the properties of logarithms to expand each.

1. $\log \frac{xy}{z}$

2. $\ln \sqrt[3]{a^2 + 1}$

Write as the logarithm of a single quantity.

3. $\frac{1}{3} [2\ln(x+3) + \ln x - \ln(x^2 - 1)]$

4. $2[\ln x - \ln(x+1) - \ln(x-1)]$

Find the equation of the tangent line to the graph at the point (1,0).

5. $y = \ln x^2$

6. $y = \ln x^{1/2}$

Find the derivative of each.

7. $h(x) = \ln(2x^2 + 1)$

14. $g(t) = \frac{\ln t}{t^2}$

8. $y = (\ln x)^4$

15. $h(t) = \frac{\ln t}{t}$

9. $y = x \ln x$

16. $y = \ln(\ln x)$

10. $y = \ln(x\sqrt{x^2 - 1})$

17. $f(x) = \ln \sqrt{\frac{x+1}{x-1}}$

11. $y = \ln \sqrt{x^2 - 4}$

12. $y = \ln\left(\frac{x}{x^2 + 1}\right)$

18. $y = \sqrt[3]{\frac{x-1}{x+1}}$

13. $y = \ln\left(\frac{2x}{x+3}\right)$

Answers

1. $\log x + \log y - \log z$

2. $\frac{1}{3} \ln(a^2 + 1)$

3. $\ln \sqrt[3]{\frac{x(x+3)^2}{x^2 - 1}}$

4. $\ln\left(\frac{x^2}{(x+1)^2(x-1)^2}\right)$

5. $y - 0 = 2(x - 1)$

6. $y - 0 = \frac{1}{2}(x - 1)$

7. $\frac{4x}{2x^2 + 1}$

8. $\frac{4(\ln x)^3}{x}$

9. $1 + \ln x$

10. $\frac{1}{x} + \frac{x}{x^2 - 1}$

11. $\frac{x}{x^2 - 4}$

12. $\frac{1 - x^2}{x(x^2 + 1)}$

13. $\frac{3}{x(x+3)}$

14. $\frac{1 - 2\ln t}{t^3}$

15. $\frac{1 - \ln t}{t^2}$

16. $\frac{1}{x \ln x}$

17. $\frac{1}{2(x+1)} - \frac{1}{2(x-1)}$

18. $\frac{1}{3(x+1)} - \frac{1}{3(x-1)}$