

Name: _____

Laws of Logs/Change of Base

Use laws of logs to expand the expression

1. $\log_2(2x)$ $\log_2 2 + \log_2 x = 1 + \log_2 x$

2. $\log(x(x-1))$ $\log x + \log(x-1)$

3. $\ln(AB^2)$ $\ln A + 2\ln B$

4. $\log_3 x \sqrt{y}$ $\log_3 x + \frac{1}{2} \log_3 y$

5. $\log_5 \sqrt[3]{x^2 + 1}$ $\frac{1}{3} \log_5 (x^2 + 1)$

6. $\ln\left(\frac{x^3 y^4}{z^6}\right)$ $3\ln x + 4\ln y - 6\ln z$

7. $\ln\left(x\sqrt{\frac{y}{z}}\right)$ $\ln x + \frac{1}{2}(\ln y - \ln z)$

Use laws of logs to combine the expression into a single log

8. $\log_3 5 + 5\log_3 2$ $\log_3 5 \cdot 2^5 = \log_3 160$

9. $\log A + \log B - 2\log C$ $\log \frac{AB}{C^2}$

10. $\ln(x^2 - 1) - \ln(x - 1)$ $\ln \frac{x^2 - 1}{x - 1} = \ln \frac{(x+1)(x-1)}{x-1} = \ln(x+1)$

11. $4\log x - 2\log(x+1) + 3\log(x-2)$ $\log \frac{x^4(x-2)^3}{(x+1)^2}$

12. $\log b + c\log d - r\log s$ $\log \frac{bd^c}{s^r}$

13. $\ln x - 2(\ln y + \ln z)$ $\ln \frac{x}{(yz)^2}$

14. $3\log x - 4\log y - \frac{1}{2}\log z$ $\log \frac{x^3}{y^4 \sqrt{z}}$

Use the change of base formula to rewrite as a natural log. Then use a calculator to evaluate.

15. $\log_2 5$ $\frac{\ln 5}{\ln 2} = 2.32$

16. $\log_3 16$ $\frac{\ln 16}{\ln 3} = 2.52$

17. $\log_5 2$ $\frac{\ln 2}{\ln 5} = .43$

18. $\log_6 92$ $\frac{\ln 92}{\ln 6} = 2.52$