Name_____ **Period**_____ **Date**_____

SIMPLIFYING LOGARITHMIC EXPRESIONS WORKSHEET

Properties:

1. $\log_a (uv) = \log_a u + \log_a v$	1. $\ln (uv) = \ln u + \ln v$
2. $\log_a (u / v) = \log_a u - \log_a v$	2. $\ln (u / v) = \ln u - \ln v$
3. $\log_a u^n = n \log_a u$	3. $\ln u^n = n \ln u$

Change of base: $\log_a x = \dfrac{\log_b x}{\log_b a}$

Use the Inverse Property to simplify.

1. $10^{\log x}$ **2.** $5^{\log_5 2x}$ **3.** $\log_5 25^{3x}$

4. $7^{\log_7 7x}$ **5.** $\log_3 27^x$ **6.** $\log_2 4^{2x}$

Use the change-of-base formula to evaluate the logarithm. Show your work. Round your result to four decimal places.

7. $\log_7 12$ **8.** $\log_4 112$ **9.** $\log_5 16$

Use properties of logs to expand the expressions.

10. $\log \dfrac{2x}{5}$ **11.** $\log \dfrac{1}{2x^2}$ **12.** $\log_7 x^2 y$

13. $\ln 5\sqrt[3]{x}$ **14.** $\log_2 \dfrac{x^2}{4}$ **15.** $\log_9 \dfrac{2x^3}{3}$

16. $\ln\sqrt{xy}$

17. $\log_6 \frac{xy^2}{\sqrt{z}}$

18. $\ln 3xy^4$

Use properties of logs to condense the expressions.

19. $\log 4 + 3\log x + \log y$

20. $\log 3 + \frac{1}{2}\log x - \log 5$

21. $2\ln x - \ln 3 + \ln 6$

22. $3\log x + \log 4 - \log x - \log 6$

23. $3\ln(x+1) - 2\ln y + \ln y + \ln 2$

24. $\frac{1}{2}\left[\ln 3 + 4\ln x - 2\ln(x-1)\right]$

Use $\log_5 3 \approx 0.6826$ and $\log_5 4 \approx 0.8614$ to approximate the value of each expression.

25. $\log_5 9$

26. $\log_5 \frac{3}{4}$

27. $\log_5 40$

28. $\log_5 27$

29. $\log_5 30$

30. $\log_5 75$