1. Evaluate \( \log_5 5^4 \)

2. Evaluate \( \log_{1,000,000} \)

3. Evaluate \( \log_{125} 5 \)

4. Evaluate \( \log_2 \left( \frac{1}{8} \right) \)

5. Write in logarithmic form: \( 5^2 = 25 \)

6. Write in logarithmic form: \( e^x = 2.4 \)

7. Write in exponential form: \( \log_4 64 = 3 \)

8. Write in exponential form: \( \log_4 x = .25 \)

9. Expand using rules of logarithms: \( \log_3 \left( \frac{a}{b} \right) \)

10. Expand using rules of logarithms: \( \log_6 (st) \)

11. Expand using rules of logarithms: \( \log_6 (a^2 b^3)^2 \)

12. Expand using the rules of logarithms: \( \log_6 \left( \frac{2x}{y^2} \right)^{1/6} \)

13. Write as a single logarithm: \( .5 \log_6(x) + .5 \log_6(y) \)

14. Write as a single logarithm: \( 3 \ln(d) - \ln(f) \)

15. Write as a single logarithm: \( 3(2 \log(a) + \log(b)) \)

16. Write as a single logarithm: \( 3 \ln(x) - \ln(xy) \)

17. Solve for \( x \): \( \log_6 32 = 5 \)

18. Solve for \( x \): \( 2 \log_{10} x + 4 = 5 \)

19. Expand using rules of logarithms: \( \ln \left( \frac{x^4}{ \sqrt[3]{y^3 z}} \right) \)

20. Write as a single logarithm: \( \frac{1}{3} \log_6 x + 4 \log_6 y - 2 \log_6 z \)
21. Graph each function. Be sure to label the asymptote!!

a. $y = 2(3)^{-1}$  

b. $y = -(4)^x + 5$  

$y = 4\left(\frac{1}{2}\right)^{x+3} - 2$

22. Solve for $x$: $\log_3 (6x - 3) = 3$

23. Solve for $x$: $\ln \sqrt{x-1} = 0$

24. Solve for $x$: $\log_4 (x - 6) + \log_4 (x) = 2$

25. Solve for $x$: $\log_2 (x + 6) - \log_2 (x - 2) = 3$

26. Solve for $x$: $4^{5x+7} = 20$

27. Solve for $x$: $e^{25x} + 6 = 13$

28. Challenge: If $\ln a = 3$ and $\ln b = 5$, find a value for $\ln(a^8 b^6)$

29. Write an exponential model for a population that starts at 1000 and increases at a rate of 2.1% every year.

30. Find the time to the nearest tenth of a year that it takes for the amount of money in an account to become $500 if $300 is compounded quarterly at 3%.

31. Find the interest rate to the nearest tenth of a percent on account if $500 is compounded continuously for 5 years and has $625 at the end of that time.