Algebra 3 **Name _____**
Chapter 4 Test Review **No Calculator Part**

Tell whether each function shows growth or decay.

1. $f(x) = .5(1.25)^x$ 2. $f(x) = \frac{5}{2}\left(\frac{1}{4}\right)^x$

Write each exponential expression in logarithmic form and each logarithmic expression in exponential form.

3. $3^5 = 243$ 4. $log_2 16 = 4$ 5. $\left(\frac{1}{3}\right)^{-3} = 27$ 6. $2 = log 100$

Evaluate each.

7. $log_{12} 144$ 8. $log_{14} \frac{1}{14}$ 9. $log\ .01$ 10. $log_5 1$

11. **Graph** $f(x) = \left(\frac{1}{2}\right)^x$ **and** $f^{-1}(x)$ **on the same axes. State the domain and range of each.**

Express as a single logarithm and simplify.

12. $log_2 128 - log_2 4$ 13. $\log 50 + \log 2$ 14. $\log 10^5 + \log 10^4$ 15. $log_3 81^5$

Use the change of base formula to evaluate each.

16. $log_{125} 625$ 17. $log_{27} 9$ 18. $log_{64} \frac{1}{4}$

Solve each equation. Check for extraneous solutions.

19. $16^x = 2^{x+2}$ 20. $27^{x-2} = 81$ 21. $log_3(x+4) = 3$ 22. $log_5 x^2 = 2$

23. $log_4 100 - log_4(x+1) = 1$ 24. $log_{12} x + log_{12}(x+1) = 1$

Simplify each.

25. lne^{3t} 26. $e^{\ln(x+4y)}$ 27. $\ln e^5 + \ln e^2$ 28. $e^{\ln 3} + e^{\ln 2}$

Describe how the graph of each is transformed from its parent function.

29. $k(x) = 4\left(-\frac{1}{2}\right)^{x-3}$ 30. $m(x) = -\frac{2}{3}(x+5)^2 - 2$ 31. $a(x) = \ln(-x+4)$

32. **Graph the exponential function,** $g(x) = -2^x + 1$. **State the equation of the asymptote and the transformations of the parent function.**

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33. **Write the equation of the inverse of** $f(x) = \frac{1}{2}x - 3$**. Check your answer by graphing.**

34. **Graph** $g(x) = -\ln(x + 2)$. **State the equation of the asymptote and the transformations of the parent function.**

Solve each equation.

35. $3^{2x} = 5$ 36. $10 = \ln 3^x$ 37. $e^{x+2} = 3$

38. **Use the change of base formula to evaluate** $log_5 40$**.**

39. What is the total value of an investment of $5000 that earned 6% interest compounded continuously for 5 years?

40. A car purchased for $13,500 will depreciate in value at a rate of approximately 15% each year. Write an exponential function to model the situation. Using logarithms to solve the equation, determine how long after the purchase will the car be worth $3000.

41. Carbon-14 is a useful dating tool for specimens between 500 and 25,000 years old, such as ancient manuscripts and artifacts. Carabon-14's half-life is 5730 years.

    a. Use $\frac{1}{2} = e^{-kt}$ to find the decay constant, k, for carbon-14.

    b. Use the natural decay function, $N(t) = N_0 e^{-kt}$, to determine how much of 10 grams of carbon-14 will remain after 1000 years.

42. Use logarithmic regression to find a function that models the increase in the number of pepper trees in a wilderness reserve over six years. Predict the year when the number of trees will reach 70.

Year	1	2	3	4	5	6
Trees	14	30	40	46	53	55

43. Use exponential regression to find a function that models the data. When will the number of telecommuters exceed 75 million?

Years After 1990	0	1	2	3	4	5	6	7	8	9	10
Telecommuters (millions)	4.4	5.5	6.6	7.3	9.1	8.5	8.7	11.1	15.7	19.6	23.6