Name______________________________ Class ___________ Date ___________

Extra Practice

Chapter 7

Lesson 7-1

Graph each equation.

1. $y = 3^x$

2. $y = 2(4)^x$

3. $y = 2^{-x}$

4. $y = \left(\frac{1}{4}\right)^x$

5. $y = -0.1^x$

6. $y = -\left(\frac{1}{2}\right)^x$

Without graphing, determine whether each equation represents exponential growth or exponential decay. Then find the *y*-intercept.

7. $y = 10^x$

8. $y = 327(0.05)^x$

9. $y = 1.023(0.98)^x$

10. $y = 0.5(1.67)^x$

11. $y = 1.14^x$

12. $y = 8(1.3)^x$

13. $y = 2\left(\frac{9}{10}\right)^x$

14. $y = 4.1(0.72)^x$

15. $y = 9.2(2.3)^x$

16. Mr. Andersen put $1000 into an account that earns 4.5% annual interest. The interest is compounded annually and there are no withdrawals. How much money will be in the account at the end of 30 years?

17. A manufacturer bought a new rolling press for $48,000. It has depreciated in value at an annual rate of 15%. What is its value 5 years after purchase? Round to the nearest hundred dollars.

Extra Practice (continued)

Lesson 7-2

Graph each function as a transformation of its parent function.

18. $y = 3^x - 1$

19. $y = \frac{1}{2}(4)^x - 3$

20. $y = -(2)^{x-2} + 2$

21. You place $900 in an investment account that earns 6% interest compounded continuously. Find the balance after 5 years.

22. Bram invested $10,000 in an account that earns simple 5% interest annually.

a. How much interest does the account earn in the first 10 years? Round to the nearest dollar.

b. How much more would the account earn in interest in the first 10 years if the interest compounded continuously? Round to the nearest dollar.

23. Radium-226 has a half-life of 1660 years. How many years does it take a radium sample to decay to 55% of the original amount? Round your answer to the nearest year.

24. The population of Blinsk was 26,150 in 2000. In 2005, the population was 28,700. Find the growth function $P(x)$ that models the population.

Lesson 7-3

Write each equation in logarithmic form.

25. $100 = 10^2$

26. $9^3 = 729$

27. $64 = 4^3$

28. $\left(\frac{1}{2}\right)^4 = \frac{1}{16}$

29. $49^{\frac{1}{2}} = 7$

30. $\left(\frac{1}{3}\right)^{-3} = 27$

31. $625^{\frac{1}{4}} = 5$

32. $2^{-5} = \frac{1}{32}$

33. $6^2 = 36$

Evaluate each logarithm.

34. $\log 1000$

35. $\log_4 256$

36. $\log_{27} 9$

37. $\log_{\frac{1}{3}} 256$

38. $\log_{125} 625$

39. $\log_8 \frac{1}{32}$

Extra Practice (continued)

Chapter 7

Graph each logarithmic function.

40. $y = 2\log x$

41. $y = \log_8 x$

42. $y = \log_4 (x + 1)$

43. You can use the equation $N = k \log A$ to estimate the number of species N that live in a region of area A. The parameter k is determined by the conditions in the region. In a rain forest, 2700 species live in 500 km^2. How many species would remain if half of the forest area were destroyed by logging and farming?

Lesson 7-4

Write each expression as a single logarithm.

44. $\log 8 + \log 3$

45. $4(\log_2 x + \log_2 3)$

46. $3 \log x + 4 \log x$

47. $\log 4 + \log 2 - \log 5$

Expand each logarithm.

48. $\log_b 2x^2y^3$

49. $\log_b 3m^3p^2$

50. $\log_b (4mn)^5$

51. $\log_b \dfrac{x^2}{2y}$

52. $\log_b \dfrac{(xy)^4}{2}$

53. $\log_b \sqrt[5]{x^3}$

54. Use the properties of logarithms to evaluate $\log_8 6 - \log_8 15 + \log_8 20$.

55. The work done in joules (J) by a gas expanding from volume V_1 to volume V_2 is modeled by the equation $W = nRT \ln V_2 - nRT \ln V_1$, where n is the quantity of gas in moles (mol), T is the temperature in kelvin (K), and $R = 8.314 \dfrac{\text{J}}{\text{mol} \cdot \text{K}}$.

a. Write the equation in terms of the ratio of the two volumes.

b. Find the work done by 1 mol of gas at 300 K as it doubles its volume.

Extra Practice (continued)

Chapter 7

Lessons 7-5 and 7-6

Solve each equation.

56. $\sqrt[3]{y^2} = 4$ **57.** $2 - 4^x = -62$ **58.** $\log x + \log 2 = 5$

59. $\log_3 (x + 1) = 4$ **60.** $e^x = 5$ **61.** $e^{\frac{x}{4}} = 5$

62. $\ln x - \ln 4 = 7$ **63.** $\log 4x = -1$ **64.** $\log 4 - \log x = -2$

65. $\ln 2 + \ln x = 4$ **66.** $4 + 5^x = 29$ **67.** $e^{3x} = 20$

Simplify each expression.

68. $5 \ln 1$ **69.** $\ln e^2$ **70.** $\dfrac{1}{\ln e^{20}}$

71. $\dfrac{\ln e}{3 \ln e^3}$ **72.** $2 \ln e^{-5}$ **73.** $\dfrac{3 \ln e^4}{2 \ln e^6}$

74. What are the domain and range of the graph of $y = \ln x$?

75. The function $T(t) = T_r + (T_i - T_r)e^{kt}$ models Newton's Law of Cooling. It allows you to predict the temperature $T(t)$ of an object t minutes after it is placed in a constant-temperature cooling environment, such as a refrigerator. T_i is the initial temperature of the object, and T_r is the temperature inside the refrigerator. The number k is a constant for the particular object in question.

a. A canned fruit drink takes 5 minutes to cool from 75°F to 68°F after it is placed in a refrigerator that keeps a constant temperature of 38°F. Find the value of the constant k for the fruit drink. Round to the nearest thousandth.

b. What will be the temperature of the fruit drink after it has been in the refrigerator for 30 minutes?

c. How long will the fruit drink have to stay in the refrigerator to have a temperature of 40°F?

d. Will the fruit drink ever have a temperature of exactly 38°F? Explain.

76. The adult population of a city is 1,150,000. A consultant to a law firm uses the function $P(t) = 1{,}150{,}000(1 - e^{-0.03t})$ to estimate the number of people $P(t)$ who have heard about a major crime t days after the crime was first reported. About how many days does it take for 60% of the population to have been exposed to news of the crime?