

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)**Chapter 7****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.
- How much interest does the account earn in the first 10 years? Round to the nearest dollar.
 - 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. $\log_b \frac{x^2}{2y}$

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

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 $R = 8.314 \frac{\text{J}}{\text{mol} \cdot \text{K}}$.

- Write the equation in terms of the ratio of the two volumes.
- 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. $\frac{1}{\ln e^{20}}$

71. $\frac{\ln e}{3 \ln e^3}$

72. $2 \ln e^{-5}$

73. $\frac{3 \ln e^4}{2 \ln e^6}$

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 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.
- What will be the temperature of the fruit drink after it has been in the refrigerator for 30 minutes?
- How long will the fruit drink have to stay in the refrigerator to have a temperature of 40°F?
- 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?