9.5 Exercise Set

↪ *Concept Reinforcement Classify each of the following statements as either true or false.*

1. The expression log 23 means $\log_{10} 23$.   True

2. The expression ln 7 means $\log_e 7$.   True

3. The number e is approximately 2.7.   True

4. The expressions log 9 and log 18/log 2 are equivalent.   False

5. The expressions log 9 and log 18 − log 2 are equivalent.   True

6. The expressions $\log_2 9$ and ln 9/ln 2 are equivalent.   True

7. The expressions ln 81 and 2 ln 9 are equivalent.   True

8. The domain of the function given by $f(x) = \ln(x + 2)$ is $(-2, \infty)$.   True

9. The range of the function given by $g(x) = e^x$ is $(0, \infty)$.   True

10. The range of the function given by $f(x) = \ln x$ is $(-\infty, \infty)$.   True

Use a calculator to find each of the following to four decimal places.

11. ln 5   1.6094
12. ln 2   0.6931
13. ln 0.0062   −5.0832
14. ln 0.00073   −7.2225
15. $\dfrac{\ln 2300}{0.08}$ 96.7583
16. $\dfrac{\ln 1900}{0.07}$ 107.8516
17. $e^{2.71}$ 15.0293
18. $e^{3.06}$ 21.3276
19. $e^{-3.49}$ 0.0305
20. $e^{-2.64}$ 0.0714
21. log 7   0.8451
22. log 2   0.3010
23. $\dfrac{\log 8200}{\log 2}$ 13.0014
24. $\dfrac{\log 5700}{\log 5}$ 5.3734
25. $\log \dfrac{3}{8}$ −0.4260
26. $\ln \frac{2}{3}$ −0.4055
27. $\ln(7) + 3$ 4.9459
28. $\log(6) - 2$ −1.2218

Find each of the following logarithms using the change-of-base formula. Round answers to the nearest ten-thousandth.

29. $\log_6 92$ 2.5237
30. $\log_3 78$ 3.9656
31. $\log_2 100$ 6.6439
32. $\log_7 100$ 2.3666
33. $\log_{0.5} 5$ −2.3219
34. $\log_{0.1} 3$ −0.4771
35. $\log_2 0.2$ −2.3219
36. $\log_2 0.08$ −3.6439
37. $\log_\pi 58$ 3.5471
38. $\log_\pi 200$ 4.6284

Graph by hand or using a graphing calculator and state the domain and the range of each function.

39. $f(x) = e^x$ ⊡
40. $f(x) = e^{-x}$ ⊡
41. $f(x) = e^x + 3$ ⊡
42. $f(x) = e^x + 2$ ⊡
43. $f(x) = e^x - 2$ ⊡
44. $f(x) = e^x - 3$ ⊡
45. $f(x) = 0.5e^x$ ⊡
46. $f(x) = 2e^x$ ⊡
47. $f(x) = 0.5e^{2x}$ ⊡
48. $f(x) = 2e^{-0.5x}$ ⊡
49. $f(x) = e^{x-3}$ ⊡
50. $f(x) = e^{x-2}$ ⊡
51. $f(x) = e^{x+2}$ ⊡
52. $f(x) = e^{x+3}$ ⊡
53. $f(x) = -e^x$ ⊡
54. $f(x) = -e^{-x}$ ⊡
55. $g(x) = \ln x + 1$ ⊡
56. $g(x) = \ln x + 3$ ⊡
57. $g(x) = \ln x - 2$ ⊡
58. $g(x) = \ln x - 1$ ⊡
59. $g(x) = 2 \ln x$ ⊡
60. $g(x) = 3 \ln x$ ⊡
61. $g(x) = -2 \ln x$ ⊡
62. $g(x) = -\ln x$ ⊡
63. $g(x) = \ln(x + 2)$ ⊡
64. $g(x) = \ln(x + 1)$ ⊡
65. $g(x) = \ln(x - 1)$ ⊡
66. $g(x) = \ln(x - 3)$ ⊡

Write an equivalent expression for the function that could be graphed using a graphing calculator. Then graph the function.

67. $f(x) = \log_5 x$ ⊡
68. $f(x) = \log_3 x$ ⊡
69. $f(x) = \log_2(x - 5)$ ⊡
70. $f(x) = \log_5(2x + 1)$ ⊡
71. $f(x) = \log_3 x + x$ ⊡
72. $f(x) = \log_2 x - x + 1$ ⊡

TW 73. Using a calculator, Aden *incorrectly* says that log 79 is between 4 and 5. How could you convince him, without using a calculator, that he is mistaken?

TW 74. Examine Exercise 73. What mistake do you believe Aden made?

SKILL REVIEW

To prepare for Section 9.6, review solving equations.

Solve.

75. $x^2 - 3x - 28 = 0$ [5.4]   −4, 7
76. $5x^2 - 7x = 0$ [5.3] $0, \frac{7}{5}$
77. $17x - 15 = 0$ [1.6] $\frac{15}{17}$
78. $\frac{5}{3} = 2t$ [1.6] $\frac{5}{6}$

⊡ Answers to Exercises 39–72 are on pp. IA-24 and IA-25.