

In Exercises 25–66, solve the exponential equation algebraically. Approximate the result to three decimal places.

25. $e^x = e^{x^2-2}$

27. $e^{x^2-3} = e^{x-2}$

29. $4(3^x) = 20$

31. $2e^x = 10$

33. $e^x - 9 = 19$

35. $3^{2x} = 80$

37. $5^{-1/2} = 0.20$

39. $3^{x-1} = 27$

41. $2^{3-x} = 565$

43. $8(10^{3x}) = 12$

45. $3(5^{x-1}) = 21$

47. $e^{3x} = 12$

49. $500e^{-x} = 300$

51. $7 - 2e^x = 5$

53. $6(2^{3x-1}) - 7 = 9$

55. $e^{2x} - 4e^x - 5 = 0$

57. $e^{2x} - 3e^x - 4 = 0$

59. $\frac{500}{100 - e^{x/2}} = 20$

61. $\frac{3000}{2 + e^{2x}} = 2$

63. $\left(1 + \frac{0.065}{365}\right)^{365t} = 4$

65. $\left(1 + \frac{0.10}{12}\right)^{12t} = 2$

26. $e^{2x} = e^{x^2-8}$

28. $e^{-x^2} = e^{x^2-2x}$

30. $2(5^x) = 32$

32. $4e^x = 91$

34. $6^x + 10 = 47$

36. $6^{5x} = 3000$

38. $4^{-3x} = 0.10$

40. $2^{x-3} = 32$

42. $8^{-2-x} = 431$

44. $5(10^{x-6}) = 7$

46. $8(3^{6-x}) = 40$

48. $e^{2x} = 50$

50. $1000e^{-4x} = 75$

52. $-14 + 3e^x = 11$

54. $8(4^{6-2x}) + 13 = 41$

56. $e^{2x} - 5e^x + 6 = 0$


58. $e^{2x} + 9e^x + 36 = 0$

60. $\frac{400}{1 + e^{-x}} = 350$

62. $\frac{119}{e^{6x} - 14} = 7$

64. $\left(4 - \frac{2.471}{40}\right)^{9t} = 21$

66. $\left(16 - \frac{0.878}{26}\right)^{3t} = 30$

 In Exercises 67–74, use a graphing utility to graph and solve the equation. Approximate the result to the nearest thousandth. Verify your result algebraically.

67. $6e^{1-x} = 25$

69. $3e^{3x/2} = 962$

71. $e^{0.09t} = 3$

73. $e^{0.125t} - 8 = 0$

68. $-4e^{-x-1} + 15 = 0$

70. $8e^{-2x/3} = 11$

72. $-e^{1.8x} + 7 = 0$

74. $e^{2.724x} = 29$

In Exercises 75–102, solve the logarithmic equation algebraically. Approximate the result to three decimal places.

75. $\ln x = -3$

77. $\ln 2x = 2.4$

79. $\log x = 6$

81. $3 \ln 5x = 10$

83. $\ln \sqrt{x+2} = 1$

85. $7 + 3 \ln x = 5$

76. $\ln x = 2$

78. $\ln 4x = 1$

80. $\log 3z = 2$

82. $2 \ln x = 7$

84. $\ln \sqrt{x-8} = 5$

86. $2 - 6 \ln x = 10$

87. $6 \log_3(0.5x) = 11$

89. $\ln x - \ln(x+1) = 2$

91. $\ln x + \ln(x-2) = 1$

92. $\ln x + \ln(x+3) = 1$

93. $\ln(x+5) = \ln(x-1) - \ln(x+1)$

94. $\ln(x+1) - \ln(x-2) = \ln x$

95. $\log_2(2x-3) = \log_2(x+4)$

96. $\log(x-6) = \log(2x+1)$

97. $\log(x+4) - \log x = \log(x+2)$


98. $\log_2 x + \log_2(x+2) = \log_2(x+6)$

99. $\log_4 x - \log_4(x-1) = \frac{1}{2}$

100. $\log_3 x + \log_3(x-8) = 2$

101. $\log 8x - \log(1+\sqrt{x}) = 2$

102. $\log 4x - \log(12+\sqrt{x}) = 2$

 In Exercises 103–106, use a graphing utility to graph and solve the equation. Approximate the result to three decimal places. Verify your result algebraically.

103. $7 = 2^x$

104. $500 = 1500e^{-x/2}$

105. $3 - \ln x = 0$

106. $10 - 4 \ln(x-2) = 0$

Compound Interest In Exercises 107 and 108, \$2500 is invested in an account at interest rate r , compounded continuously. Find the time required for the amount to (a) double and (b) triple.

107. $r = 0.085$

108. $r = 0.12$

109. Demand The demand equation for a microwave oven is given by

$$p = 500 - 0.5(e^{0.004x}).$$

Find the demand x for a price of (a) $p = \$350$ and (b) $p = \$300$.


110. Demand The demand equation for a hand-held electronic organizer is

$$p = 5000 \left(1 - \frac{4}{4 + e^{-0.002x}} \right).$$

Find the demand x for a price of (a) $p = \$600$ and (b) $p = \$400$.

111. Forest Yield The yield V (in millions of cubic feet per acre) for a forest at age t years is given by

$$V = 6.7e^{-48.1/t}.$$

 (a) Use a graphing utility to graph the function.

(b) Determine the horizontal asymptote of the function. Interpret its meaning in the context of the problem.

(c) Find the time necessary to obtain a yield of 1.3 million cubic feet.