

5.6 Assess Your Understanding

'Are You Prepared?' Answers are given at the end of these exercises. If you get a wrong answer, read the pages listed in red.

- Solve $x^2 - 7x - 30 = 0$. (pp. A47–A51)
- Solve $(x + 3)^2 - 4(x + 3) + 3 = 0$. (pp. A47–A51)
- Approximate the solution(s) to $x^3 = x^2 - 5$ using a graphing utility. (pp. B6–B7)
- Approximate the solution(s) to $x^3 - 2x + 2 = 0$ using a graphing utility. (pp. B6–B7)

Skill Building

In Problems 5–32, solve each logarithmic equation. Express irrational solutions in exact form and as a decimal rounded to three decimal places.

- $\log_4 x = 2$
- $\log_3(3x - 1) = 2$
- $\frac{1}{2} \log_3 x = 2 \log_3 2$
- $2 \log_5 x = 3 \log_5 4$
- $\log x + \log(x + 15) = 2$
- $\log(2x) - \log(x - 3) = 1$
- $\log_8(x + 6) = 1 - \log_8(x + 4)$
- $\ln(x + 1) - \ln x = 2$
- $\log_{1/3}(x^2 + x) - \log_{1/3}(x^2 - x) = -1$
- $\log_{10}(x - 1) - \log_{10}(x + 6) = \log_{10}(x - 2) - \log_{10}(x + 3)$
- $\log(x + 6) = 1$
- $\log_4(x + 2) = \log_4 8$
- $-2 \log_4 x = \log_4 9$
- $3 \log_2(x - 1) + \log_2 4 = 5$
- $\log x + \log(x - 21) = 2$
- $\log_2(x + 7) + \log_2(x + 8) = 1$
- $\log_5(x + 3) = 1 - \log_5(x - 1)$
- $\log_3(x + 1) + \log_3(x + 4) = 2$
- $\log_4(x^2 - 9) - \log_4(x + 3) = 3$
- $\log_a x + \log_a(x - 2) = \log_a(x + 4)$
- $\log_2(5x) = 4$
- $\log_5(2x + 3) = \log_5 3$
- $3 \log_2 x = -\log_2 27$
- $2 \log_3(x + 4) - \log_3 9 = 2$
- $\log(2x + 1) = 1 + \log(x - 2)$
- $\log_6(x + 4) + \log_6(x + 3) = 1$
- $\ln x + \ln(x + 2) = 4$
- $\log_2(x + 1) + \log_2(x + 7) = 3$

In Problems 33–60, solve each exponential equation. Express irrational solutions in exact form and as a decimal rounded to three decimal places.

- $2^{x-5} = 8$
- $8^{-x} = 1.2$
- $3^{1-2x} = 4^x$
- $1.2^x = (0.5)^{-x}$
- $5^{-x} = 25$
- $2^{-x} = 1.5$
- $2^{x+1} = 5^{1-2x}$
- $0.3^{1+x} = 1.7^{2x-1}$
- $2^x = 10$
- $5(2^{3x}) = 8$
- $\left(\frac{3}{5}\right)^x = 7^{1-x}$
- $\pi^{1-x} = e^x$
- $3^x = 14$
- $0.3(4^{0.2x}) = 0.2$
- $\left(\frac{4}{3}\right)^{1-x} = 5^x$
- $e^{x+3} = \pi^x$

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- $2^{2x} + 2^x - 12 = 0$
 - $16^x + 4^{x+1} - 3 = 0$
 - $3 \cdot 4^x + 4 \cdot 2^x + 8 = 0$
 - $9^x + 3^{x+1} + 1 = 0$
 - $2 \cdot 49^x + 11 \cdot 7^x + 5 = 0$
 - $3^{2x} + 3^x - 2 = 0$
 - $9^x - 3^{x+1} + 1 = 0$
 - $25^x - 8 \cdot 5^x = -16$
 - $4^x - 10 \cdot 4^{-x} = 3$
 - $3^{2x} + 3^{x+1} - 4 = 0$
 - $25^x + 2^{x+2} - 12 = 0$
 - $36^x - 6 \cdot 6^x = -9$
 - $3^x - 14 \cdot 3^{-x} = 5$
- In Problems 61–74, use a graphing utility to solve each equation. Express your answer rounded to two decimal places.
- $\log_5(x + 1) - \log_4(x - 2) = 1$
 - $\log_2(x - 1) - \log_6(x + 2) = 2$
 - $e^x = -x$
 - $e^{2x} = x + 2$
 - $e^x = x^2$
 - $e^x = x^3$
 - $\ln x = -x$
 - $\ln(2x) = -x + 2$
 - $\ln x = x^3 - 1$
 - $\ln x = -x^2$