

Solving Logarithmic and Exponential Equations WKST

I. Find the domain. State your answer in interval notation.

1. $y = \log(x-3)$	2. $y = 8 - 5\log(2x+7)$	3. $y = \ln(x^2 + 9)$
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II. Solve the logarithmic equation.

4. $\log_9(x^2 - 4x) = \log_9(3x - 10)$	5. $\log_{\sqrt{3}} x = 6$	6. $2 - \log_2(x+1) = 4$
7. $\log_{12}(x^2 - 7) = \log_{12}(x+5)$	8. $\log_x 49 = 2$	9. $\log(x-7) = 3$
10. $\log_4(2x+2) - \log_4(x-2) = 1$	11. $\log_6(x^2 - 6x) = \log_6(-8)$	12. $3\log_5(4-x) + 1 = 7$
13. $\log_3 6 + \log_3 x = \log_3 12$	14. $6\ln(-x) + 3 = 21$	15. $13\log x - 6 = 6$
16. $\log_6 x + \log_6(x+1) = 1$	17. $\log_3(x^2 - 3) = \log_3 2 + \log_3 x$	
18. $\log_{81} x = \frac{3}{4}$	19. Challenge: $(\log_2 x)^2 = 2\log_2 x + 3$	

III. Solve the exponential equation.

20. $3^{x+5} = 7$	21. $\left(\frac{1}{125}\right)^{x+2} = 25^{3-x}$	22. $4^{2x-3} = 12$	23. $4^x = 8^{\text{chocolate}}$
24. $3\sqrt{27} = 3^{4x}$	25. $3^{x+4} = 6^{2x-5}$	26. $\frac{3000}{2+e^{2x}} = 2$	27. $16^{18} + 16^{18} + 16^{18} + 16^{18} = 4^x$
28. $4^{1/x} = 16$	29. $5^{2x} - 5 \cdot 5^x + 6 = 0$	30. $8^x(16^{x-1}) = 4(32^{2x+3})$	31. $7^{3x-8} = 2^{5-x}$

IV. Solve.

32. $\ln e^{3x+5} = 11$	33. $\log_x 125 = \frac{3}{2}$
34. $\log_2 x^3 = \log_2 x$	35. $\log_4(3x+1) - \log_4(x-4) = \log_4 2$
36. $\ln \sqrt[4]{x-1} = 1$	37. If $f(x) = \log(x+3)$, find $f^{-1}(2)$
38. $\frac{e^x + 7e^{-x}}{-2} = -4$	39. $e^{2x} \ln x + e^{2x} = 0$
40. $2x \ln\left(\frac{1}{x}\right) - x = 0$	41. $\log_2(x+1) = \log_4 4x$

V. Use your calculator to solve the equation or inequality. Round to three decimal places.

42. $\ln x = e^{-x}$	43. $\ln x = \sqrt[4]{x}$
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ANSWERS

1. $(0, \infty)$

2. $\left(-\frac{7}{2}, \infty\right)$

3. $(-\infty, \infty)$

4. 5

5. 27

6. $-\frac{3}{4}$

7. 4, -3

8. 7

9. 1007

10. 5

11. no solution

12. -21

13. 2

14. $-e^3$

15. 10,000

16. 2

17. 3

18. 27

19. 0.5, 8

20. $-5 + \log_3 7$

21. -12

22. $\frac{3 + \log_3 12}{2}$

23. 3chocolate/2

24. $\frac{5}{8}$

25. $\frac{4 \log 3 + 5 \log 6}{2 \log 6 - \log 3}$

26. $\frac{\ln 1498}{2}$

27. 37

28. $\frac{1}{2}$

29. $\log_5 3, \log_5 2$

30. -7

31. $\frac{5 \log 2 + 8 \log 7}{3 \log 7 + \log 2}$

32. 2

33. 25

34. 1

35. no solution

36. $e^4 + 1$

37. 97

38. 0, $\ln 7$

39. e^{-1}

40. 0, $e^{-1/2}$

41. 1

42. 1.310

43. 4.177