

P5-5 #14, 15, 41, 45, 46, 47, 9-16all

Lesson Check

Do you know HOW?

Solve each equation.

12. $3^x = 9$

13. $2^{x+1} = 25$

14. $\log 4x = 2$

15. $\log x - \log 2 = 3$

Solve each equation. If necessary, round to the nearest ten thousandth.

38. $8^x = 444$

39. $\frac{1}{2} \log x + \log 4 = 2$

40. $4 \log_3 2 - 2 \log_3 x = 1$

41. $\log x^2 = 2$

42. $9^{2x} = 42$

43. $\log_8(2x - 1) = \frac{1}{3}$

44. $\log(5x - 4) = 3$

45. $12^{4-x} = 20$

46. $5^{3x} = 125$

47. $\log 4 + 2 \log x = 6$

48. $4^{3x} = 77.2$

49. $\log_7 3x = 3$

Write each expression as a single natural logarithm.

9. $4 \ln 3$

10. $\ln 18 - \ln 10$

11. $\ln 3 + \ln 4$

12. $-2 \ln 2$

Solve each equation.

13. $\ln 5x = 4$

14. $\ln(x - 7) = 2$

15. $2 \ln x = 4$

16. $\ln(2 - x) = 1$

HINT: Look at your notes to reference properties

14

$$\log 4x = 2$$

$$\log_{10} 4x = 2$$

$$\cancel{10}^{\log_{10} 4x} = 10^2$$

$$\frac{4x}{4} = \frac{100}{4}$$

$$\boxed{x = 25}$$

15

$$\log x - \log 2 = 3$$

$$\log \frac{x}{2} = 3$$

$$\log_{10} \frac{x}{2} = 3$$

$$\cancel{10}^{\log_{10} \frac{x}{2}} = 10^3$$

$$\frac{x}{2} = 1000$$

Multiply by 2
both sides

$$\boxed{x = 2000}$$

41

$$\log x^2 = 2$$

$$\log_{10} x^2 = 2$$

$$\cancel{10}^{\log_{10} x^2} = 10^2$$

$$x^2 = 100$$

Square root
both sides

$$\boxed{x = \pm 10}$$

↳ Both solutions

45

$$12^{4-x} = 20$$

$$\sqrt{\ln 12^{(4-x)}} = \ln 20$$

$$(4-x) \cdot \frac{\ln 12}{\ln 12} = \frac{\ln 20}{\ln 12}$$

46

$$5^{3x} = 125$$

$$5^{3x} = 5^3$$

$$3x = 3$$

$$\boxed{x = 1}$$

$$4-x = \frac{\ln 20}{\ln 12}$$

Subtract 4
both sides

$$-x = \frac{\ln 20}{\ln 12} - 4$$

Multiply
by -1 both
sides

$$x = -\frac{\ln 20}{\ln 12} + 4$$

$$\boxed{x \approx 2.794}$$

47

$$\log 4 + 2 \log x = 6$$

$$\log 4 + \log x^2 = 6$$

9

$$4 \ln 3 = \ln 3^4 = \boxed{\ln 81}$$

~~x = 500~~

$$\log 4 \cdot x^2 = 6$$

$$\log_{10} 4x^2 = 6$$

10

$$\ln 18 - \ln 10 = \ln \frac{18}{10} = \boxed{\ln \frac{9}{5}}$$

$$\boxed{x = 500}$$

Only solution

$$\cancel{10}^{\log_{10} 4x^2} = 10^6$$

11

$$\ln 3 + \ln 4 = \ln 3 \cdot 4 = \boxed{\ln 12}$$

12

$$-2 \ln 2 = \ln 2^{-2} = \ln \frac{1}{2^2} = \boxed{\ln \frac{1}{4}}$$

13

$$\ln 5x = 4$$

$$4x^2 = 1,000,000$$

$$x^2 = 250,000$$

$$x = \pm 500$$

$$e^{\ln 5x} = e^4$$

$$\frac{5x}{5} = \frac{e^4}{5}$$

$$\boxed{x = \frac{e^4}{5} \approx 10.920}$$

#14 $\ln(x-7) = 2$

~~$e^{\ln(x-7)}$~~ $= e^2$

$$x-7 = e^2$$

$$x = e^2 + 7$$
$$x \approx 14.389$$

#15 $2 \ln x = 4$

$$\ln x^2 = 4$$

~~$e^{\ln x^2}$~~ $= e^4$

$$x^2 = e^4$$

$$x = \pm \sqrt{e^4} = \pm e^2$$

~~$x = \pm e^2$~~

$$x = e^2 \approx 7.389$$

only solution

#16 $\ln(2-x) = 1$

~~$e^{\ln(2-x)}$~~ $= e^1$

$$\begin{array}{r} 2-x = e \\ -2 \quad -2 \\ \hline \end{array}$$

$$-x = e - 2$$

$$x = -e + 2$$
$$x \approx -0.718$$