7.6 Homework

Name Key

4-18 Even, 24-42 even, 54, 57

(4-18) Solve the equation.

4) $7^{3x+4} = 49^{2x+1}$

$7^{3x+4} = 7^{2(2x+1)}$

$7^{3x+4} = 7^{4x+2}$

$3x+4 = 4x+2$

$\boxed{x=2}$

6) $27^{4x-1} = 9^{3x+8}$

$\boxed{x = \frac{19}{6}}$

8) $3^{3x-7} = 81^{12-3x}$

$\boxed{x = \frac{11}{3}}$

10) $10^{3x-10} = \left(\frac{1}{100}\right)^{6x-1}$

$\boxed{x = \frac{4}{5}}$

12) $8^x = 20$

$\log(8^x) = \log(20)$

$x \cdot \log 8 = \log 20$

$x = \frac{\log 20}{\log 8}$

$\boxed{x \approx 1.441}$

14) $7^{3x} = 18$

$\boxed{x \approx 0.495}$

16) $7^{6x} = 12$

$\boxed{x \approx .213}$

18) $10^{3x} + 4 = 9$

$\boxed{x \approx .233}$

SOLVE LOGARTHMIC EQUATIONS (24-30) Solve the equation. Check for extraneous solutions.

24) $\log_5(5x+9) = \log_5 6x$

$x = 9$

26) $\ln(x+19) = \ln(7x-8)$

$x = \frac{9}{2}$

28) $\log(12x-11) = \log(3x+13)$

$x = \frac{8}{3}$

30) $\log_6(3x-10) = \log_6(14-5x)$

$3x-10 = 14-5x$

$8x = 24$

$\boxed{\cancel{x=3}}$

no solution!

$\log_6(3 \cdot 3-10)$

$\log_6(-1)$

$\downarrow$

doesn't work!

EXPONENTIATING LOGARTHMIC EQUATIONS (32-42) Solve the equation. Check for extraneous solutions.

32) $\log_4 x = -1$

$\boxed{x = \frac{1}{4}}$

34) $\frac{1}{3}\log_5 12x = 2$

$$\boxed{\begin{array}{l} x = \frac{15625}{12} \\ x \approx 1302.08 \end{array}}$$

36) $\log_2(x-4) = 6$

$\boxed{x = 68}$

38) $\log_4(-x) + \log_4(x+10) = 2$

$\boxed{x = -8, -2}$

40) $4\ln(-x) + 3 = 21$

$$\boxed{\begin{array}{l} x = -e^{9/2} \\ x \approx -90.02 \end{array}}$$

42) $\log_6 3x + \log_6(x-1) = 3$

$\boxed{x = 9}$

54) You are cooking beef stew. When you take the beef stew off the stove, it has a temperature of 200 degrees F. The room temperature is 75 degrees F and the cooling rate of the beef stew is r=0.054. How long (in minutes) will it take to cool the beef stew to a serving temperature of 100 degrees F? (hint: use your notes for Newton's Law of Cooling)

$$T = (200 - 75)e^{-.054(t)} + 75$$

$$100 = (125)e^{-.054t} + 75$$

show work here ← now solve for t

$t = \boxed{29.80 \text{ mins}}$

57) One hundred grams of radium are stored in a container. The amount R (in grams) of radium present after t years can be modeled by $R = 100e^{-0.00043t}$. After how many years will only 5 grams of radium be present?

$$5 = 100e^{-.00043t}$$

solve for t

$\boxed{t = 6967 \text{ years}}$