Chapter 7.6: Solve Exponential and Logarithmic Equations

If b is a positive number other than one

$$b^x = b^y \quad \text{if} \quad x = y$$

Solve: $4^x = \left(\frac{1}{2}\right)^{x-3}$

$2^{2(x)} = 2^{-1(x-3)}$

$2x = -x + 3$

$+x \quad +x$

$3x = 3$

$x = 1$

Solve: $4^x = 11$

$\log_4 4^x = \log_4 11$

$x = \log_4 11$

$x = \frac{\log 11}{\log 4} \approx 1.729$

$\log_a a^x = x$

$\log_{10} 10 = 1$

$10^1 = 10$

Newtons Cooling Law

If b,x and y are positive number and b is not 1 then

$$\log_b x = \log_b y \quad \text{if} \quad x = y$$

$\log x = \log y \qquad x = y$

$\ln x = \ln y \qquad x = y$

Solve: $\log_5(4x-7) = \log_5(x+5)$

$4x - 7 = x + 5$

$-x \quad +7 \quad -x \quad +7$

$\frac{3x}{3} = \frac{12}{3}$

$x = 4$

Solve: $\log_4(5x-1)=3$

$a^{\log_a x} = x$

$4^{\log_4(5x-1)} = 4^3$

$5x-1 = 4^3$

$5x-1 = 64$

$+1 \quad +1$

$5x = 65$

$x = 13$

What are the solutions:

$$\log(2x)+\log(x-5)=2$$

$10^{\log 2x(x-5)} = 10^2$

$2x(x-5) = 100$

$2x^2-10x-100=0$

$x^2-5x-50=0$

$(x+5)(x-10)=0$

$x = -5, 10$

Homework: Chapter 7.6 pg.519
#'s 4,10,14,18,26,30,32,36,42,50