PC 4-0 **Chapter Preview and Homework**

I can convert exponential equations to logarithms and visa versa

Use the "circle of logs" to convert the logarithm into an exponential equation.

Example: $log_3 x = 2$

$3^2 = x$

$9 = x$

Practice:

$log_x 16 = 2$

Convert the exponoential equation into a logarithm.

Example: $3^x = 7$

$\log_3 7 = x$

Practice:

$4^x = 56$

The **natural logarithm** is a log with a base of "*e*". *It looks like this:* $\ln x$

So, $\boldsymbol{\ln x = log_e x}$.

Also, if we write $\log x$ without a base, it is assumed that the base is 10. (You'll notice your calculator has this button). So, $\boldsymbol{\log x = log_{10} x}$

Rewrite in exponential form to help solve for x. NO CALCULATORS!!!

1. $log_2 8 = x$

2. $log_4\left(\frac{1}{16}\right) = x$

3. $log_x 49 = 2$

4. $\log x = 2$

I can find the domain of a logarithmic function

Find the domain of the logarithm.

$y = \ln(x - 3)$

This must be greater than 0.

$x - 3 > 0$

$+3 \quad +3$

$x > 3$

$D: \{x \mid x > 3\}$

Find the domain of the logarithm.

$y = log\left(\frac{1}{x+1}\right)$

5. Find the domain of the logarithm.

$y = log_3(x + 7)$

6. Find the domain of the logarithm.

$y = ln\left(\frac{3}{4x+5}\right)$

I can re-write and solve logarithmic equations

Solve the equation.

$log_5 x = 3$

Solve the equation. (Hint: Re-Base Method)

$log_3 81 = 2x - 8$

7. Solve the following equations for x.

$log_2(2x+1)=3$	$log_3(3x-2)=2$	$log_x 4=2$	$log_6 36=5x+3$

Extraneous Solutions appear when solving logarithms when a solution is not part of the domain.

Example: Solve for x. $log_6 x + log_6(x-5) = 1$

$\log_6(x)(x-5)=1$

$6^1=(x)(x-5)$

$6=x^2-5x$

$0=x^2-5x-6$

$0=(x-6)(x+1)$

$x=6$ $x=-1$ Extraneous

8. $log_3(x^2+1)=2$

9. $log_{10}x + log_{10}(x+15)=2$

(Hint: Use properties of logarithms)

If $M=N$, then $log_a M = log_a N$

If $log_a M = log_a N$, then $M=N$

Change of Base Formula

If $a \neq 1$, $b \neq 1$, and M are positive real numbers, then

$$log_a M = \frac{log_b M}{log_b a}$$

10. Solve for x.

$\log 3 = \log x$

11. Solve for x.

$\ln 3x = \log 9$

12. Solve for x.

$\log 2x + 3 = \log 9$

13. Use the change of base formula and then evaluate with a calculator.

$log_5 12$

14. Use the change of base formula and then evaluate with a calculator.

$log_2 9$

15. Use the change of base formula and then evaluate with a calculator.

$log_6 8$