Inverse Functions - Remember?

Two functions are inverses if
$f(g(x)) = g(f(x)) = x$

This is true of $\log_a(x)$ and a^x

For example,

$\log_3(3^x) = x$ and $3^{(\log_3(x))} = x$

Exponential Functions v. Log Functions

	10^x	logx
Domain	$(-\infty,\infty)$	$(0,\infty)$
Range	$(0,\infty)$	$(-\infty,\infty)$
X-Intercept	none	(1,0)
Y-Intercept	(0,1)	none
Asymptote	y=0	x=0

Logarithmic Functions 101

For $x>0$, $a>0$ and $a\neq1$

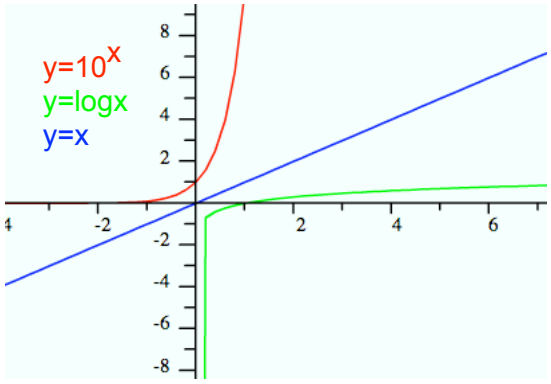
$y=\log_a x$ if and only if $x=a^y$

The function given by $f(x) = \log_a x$ is read "log base a of x"

The REAL definition of log

$$\int_1^x \frac{1}{t}dt = \log(x)$$

You don't need to know this, I just didn't want to lie to you



Transformations of Logarithmic Functions

Works just like other transformations!

$$f(x) = a \cdot \log_{\alpha}(\pm x - h) + k$$

a is the steepness, if negative the reflection over x-axis
h is the horizontal shift
k is the vertical shift
If -x, reflected over y-axis

Properties of Logarithms

1. $\log_a 1 = 0$, since $a^0 = 1$
2. $\log_a a = 1$ since $a^1 = a$
3. $\log_a a^x = x$ since $a^{(\log_a(x))} = x$
4. If $\log_a x = \log_a y$, then $x = y$

Homework: O.B. p195 1-52
Y.B. p 203 1-6, 13-18, 25-62

Due Wednesday by the end of the period

QUIZ FRIDAY!!

Natural Logs - *Base e

This is so common, mathematicians gave it its own symbol, ln(x), read "natural log of x"

$y=\ln(x)$ if and only if $x=e^y$

$f(x) = \log_e x = \ln(x)$

Properties of Natural Logarithms

1. $\ln 1 = 0$, since $e^0 = 1$
2. $\ln e = 1$ since $e^1 = e$
3. $\ln e^x = x$ since $e^{\ln(x)} = x$
4. If $\ln x = \ln y$, then $x = y$

These should look familiar!

Homework:
O.B. p195 Vocab Check 1-5, 53-69, 77-79
Y.B. p 203 Vocab Check 1-5, 67-80

Due Friday

QUIZ FRIDAY!