Bellwork #8 **Name**_____

1) What is the inverse of a function?

Def: an inverse of a function is a function that undoes the other function

2) How do you find the inverse of a function?

- given an equation, switch x & y & then solve for y.

$y = x$

$y = 2\left(\frac{x-1}{2}\right) + 1$

$y = 2x + 1$

$x = 2y + 1$

$-1 \quad -1$

$\frac{x-1}{2} = \frac{2y}{2}$

$\frac{x-1}{2} = y$

3) What is the vertical line test?

(graph)

if vertical line touches graph more than once, then it is not a function.

4) What is the horizontal line test?

(graph)

tells if the inverse of a function is a function

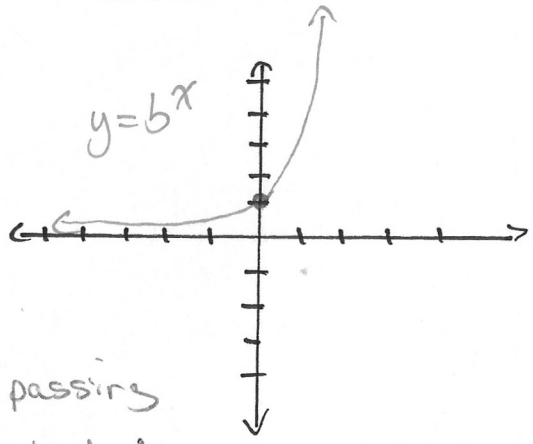
(can only touch once)

Review exponential function

general form: $y = b^x$

numeric base raised to variable expo

if $b > 1$ growth if $0 < b < 1$ decay



* by passing horizontal line test → means inverse of $y = b^x$ is a function

if $y = b^x$, the inverse $x = b^y$

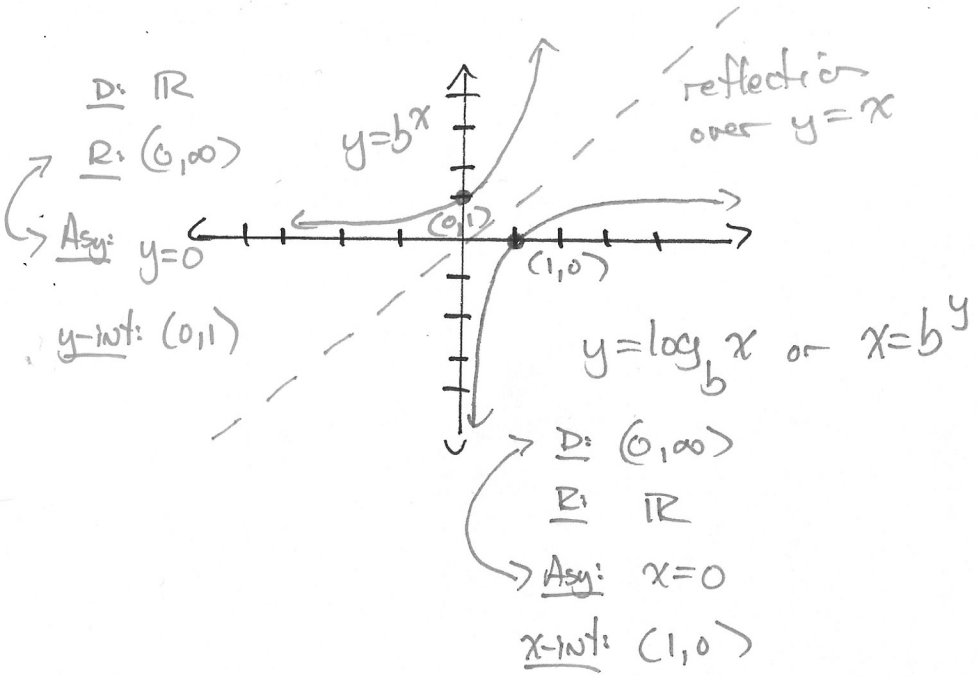
$x = b^y$ exponential form of a logarithm

Log form is $\log_b x = y$

value

base

exponent



Changing between expo form & Log form

Given: $4^3 = 64$ $\quad \log_4 64 = 3$ (raised)

$\log_4 64 = 3$

Given: $2^{-4} = \frac{1}{16}$ $\quad \log_2 \frac{1}{16} = -4$

Given: $\log_3 27 = 3$ $\quad 3^3 = 27$

Given: $\log_{\frac{1}{4}} 16 = -2$ $\quad \left(\frac{1}{4}\right)^{-2} = 16$

if $\log_b x = y$

$b > 0$ & $b \neq 1$

$y \Rightarrow +/-$

$x \neq -\#$ $\quad b^y = x$ impossible to raise a positive base & get - value

Properties of Log

Product property: $\log_b(mn) = \log_b m + \log_b n$

Quotient prop: $\log_b\left(\frac{m}{n}\right) = \log_b m - \log_b n$

Power prop: $\log_b m^p = p \cdot \log_b m$

Equality prop: if $\log_b m = \log_b n$,

then $m = n$

Expanded form to condensed

ex: $\log_4 3 + \log_4 x = \log_4 (3x)$

ex: $2\log_9 x + \log_9 2 + \log_9 4 = \log_9 (8x^2)$

$\log_9 x^2 + \quad +$

ex: $\log_2 x + \log_2 5 - \log_2 (x+4)$

$\log_2 (5x) - \log_2 (x+4) = \log_2 \frac{5x}{x+4}$

Using the Properties to solve:

ex: $\log_6 (2x+4) = \log_6 64$

one log on both sides (same log)

$2x+4 = 64$

$-4 \quad -4$

$2x = 60$

$x = 30$

ex: $2\log_6 4 - \frac{1}{4}\log_6 16 = \log_6 (x+1)$

$\log_6 4^2 - \log_6 16^{1/4}$

$\log_6 \frac{4^2}{16^{1/4}}$

$\log_6 \frac{16}{2} = \log_6 8 = \log_6 (x+1)$

$8 = x+1$

$7 = x$

ex: $\log_{11} x + \log_{11} (x+1) = \log_{11} 6$

$\log_{11} x(x+1) = \log_{11} 6$

$x(x+1) = 6$

$x^2 + x = 6 \qquad x^2 + x - 6 = 0$

$(x+3)(x-2) = 0$

$x = -3, 2$

-3 does not because gives negative value

ex: $\log_2 4 + \log_2 (x+3) = 5$

$\log_2 4x+12 = 5$

* log is not on both sides

$2^5 = 4x+12$

$32 = 4x+12$

$-12 \quad -12$

$20 = 4x \qquad x = 5$

* set up exponentially

Evaluating log : solving for exponent

ex: $\log_2 16 = ?$ $\qquad 2^? = 16$

$x = 4$

ex: $\log_2 \frac{1}{8} = x \qquad 2^x = \frac{1}{8}$

$x = -3$