Name_____

Date_____

Unit 3: Exponential, Log, and Power Functions

Advanced Algebra

Inverse of Functions- Assignment #7

I can find the inverse of a function. I can put functions in context.

Note: To find an inverse of a function you 1) Switch the x and y variables 2) Solve for y

Example: Given y = 3x + 2 Find the Inverse of the function

$x = 3y + 2$

$3y = x - 2$

$y = \frac{(x-2)}{3}$

Use your calculator to fill in the table

F(x)

x	y
0	2
1	5
2	8
3	11

$f^{-1}(x)$ This is notation for Inverse

x	y
2	0
5	1
8	2
11	3

What do you notice about the table values? They Are Reversed

So you can build an Inverse by switching the ordered pairs (x,y) to (y,x)

Now we will take 10 minutes to put an Inverse in context.....

Context: Write a scenario as to what the function **y = 3x + 2** could represent. Be specific. Say exactly what the input could represent in real life. What would the 2 represent? What would the value of y represent. Be specific.

X = # of Months

y = Total # of books

Write what the Inverse of the given function would represent. Again be specific. What would the input be and what would the output be.

X = Total # of Books Read

y = # of Months

Assignment #7

Now you write a linear function in the form y = mx+b. Put your function in context. Some ideas from previous units involved money. Imagine you are saving for something big. This could be one idea.

Graph your function on graph paper. Show each function and what they are representing.

My function is $y = 10x + 5$

It represents Amount of $ you make/hour

My Inverse of my function is $y = \frac{x-5}{10}$

$x = 10y + 5$

$10y = x - 5$

$\frac{(x-5)}{10}$

It would represent

Input: Total money you have

output: how many hours you have

Class Practice: Find the inverse of the following linear equations. **Use your calculator to show the tables are reversed.** Copy 4 entries for each problem. State the domain for the Inverse function.

1) y = 6 -2x

x	y
1	4
2	2
3	0
4	-2

x	y
-2	4
0	3
2	2
4	1

f(x)

$y = -2x + 6$

$f^{-1}(x)$

$x = 6 - 2y$

$-\frac{(x-6)}{2} = y$

Domain: All Real

Range: All Real

2) $y = 2 - \frac{6}{x}$

x	y
1	-4
2	-1
3	0
4	$\frac{1}{2}$

x	y
$\frac{1}{2}$	4
0	3
-1	2
-4	1

f(x)

$y = 2 - \frac{6}{x}$

$f^{-1}(x)$

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

$y(x-2) = -6$

$y = \frac{-6}{(x-2)}$

Domain: All Real; $x \neq 2$

Range: All Real $y \neq 0$

3) y=-6(x-2)

x	y
0	12
1	6
2	0
3	-6

x	y
12	0
6	1
0	2
-6	3

f(x)

$y = -6(x-2)$

$f^{-1}(x)$

$x = -6(y-2)$

$x = -6y + 12$

$y = \frac{x-12}{6}$

Domain: All Real

Range: All Real

4) $y = \frac{-6}{(x-2)}$

x	y
0	3
1	6
3	-6
4	-3

x	y
3	0
6	1
-6	3
-3	4

f(x)

$y = \frac{-6}{(x-2)}$

$f^{-1}(x)$

$y = \frac{-6}{x} + 2$

$x = \frac{-6}{(y-2)}$

$(y-2)x = -6$

$y - 2 = \frac{-6}{x}$

Dom: All Real $x \neq 0$

Key Point: To find Inverse you switch the x & y and solve for y.

To do now in class: Find the inverse of the following functions. State the domain and range for the inverse function. Sketch a graph of #3 and #4.

1) $y = 2x-3$

$x = 2y-3$

$\frac{x+3}{2} = y$

2) $3x + 2y = 4$

$3y + 2x = 4$

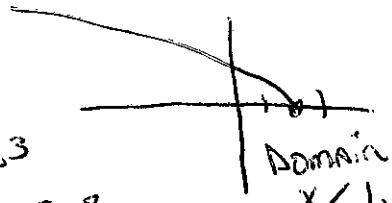
$y = \frac{4-2x}{3}$

3) $x^2 + 2y = 3$

$y^2 + 2x = 3$

$y^2 = 3-2x$

$y = \sqrt{3-2x}$



Domain $x < 1.5$

Range $y \geq 0$

4) $y = 6 + \frac{2}{x}$

$x = 6 + \frac{2}{y}$

$y(x-6) = 2$

$y = \frac{2}{(x-6)}$

5) $y=2x+3$

$x = 2y+3$

$y = \frac{(x-3)}{2}$

6) $y=3x-4$

$x = 3y-4$

$\frac{x+4}{3} = y$

7) $y = \frac{2x+4}{5}$

$x = \frac{2y+4}{5}$

8) $y = \frac{x}{4} + 6$

$x = \frac{y}{4} + 6$

$\frac{(x-6)}{4} = y$

9) $y=5x-6$

$x = 5y-6$

$\frac{(x+6)}{5} = y$

10) $y = \frac{7x+5}{3}$

$x = \frac{7y+5}{3}$

$\frac{3x-5}{7} = y$

11) $y= -2x+5$

$x = -2y+5$

$\frac{(x-5)}{-2} = y$

12) $y = \frac{x}{4} + 7$

$x = \frac{y}{4} + 7$

$4(x-7) = y$

Assignment #7

Key point: Two functions are inverses of each other if f(g(x))= x and g(f(x))=x

Use a composition of functions strategy or making two tables to verify if the following functions are inverses of each other.

5) f(x) = 4x-6 and g(x) = $\frac{(x-6)}{4}$

f(g(x))

$4\left(\frac{x-6}{4}\right)-6$

$x-12$

No There Are Not Inverse functions because f(g(x))= x-2

6) f(x) = $3x^2 + 2$ and g(x) = $\sqrt{\frac{(x-2)}{3}}$

f(g(x))

$3\left(\sqrt{\frac{x-2}{3}}\right)^2 + 2$

$3\cdot\frac{(x-2)}{3} + 2$ → x

g(f(x))

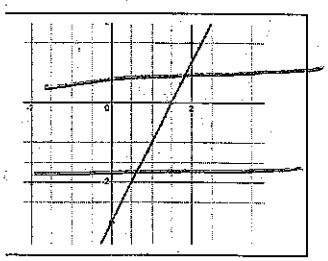
$\sqrt{\frac{3x^2+2-2}{3}}$ → $\sqrt{x^2}$ → x

Yes There Are Inverse because f(g(x))=x and g(f(x))=x

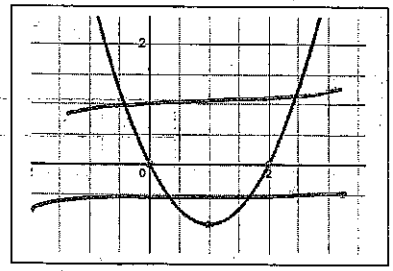
7) f(x) = 2x+5 g(x) = $\frac{(x-5)}{2}$

Horizontal Line Test: For a Function to have an Inverse function, no horizontal line can cut its's graph more than once.

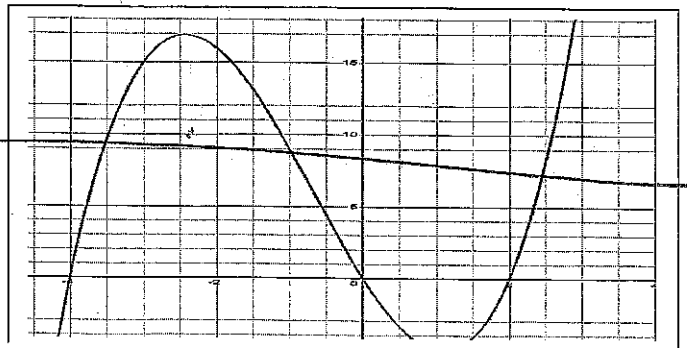
Which of the following functions have an inverse function?



Yes



NO



NO

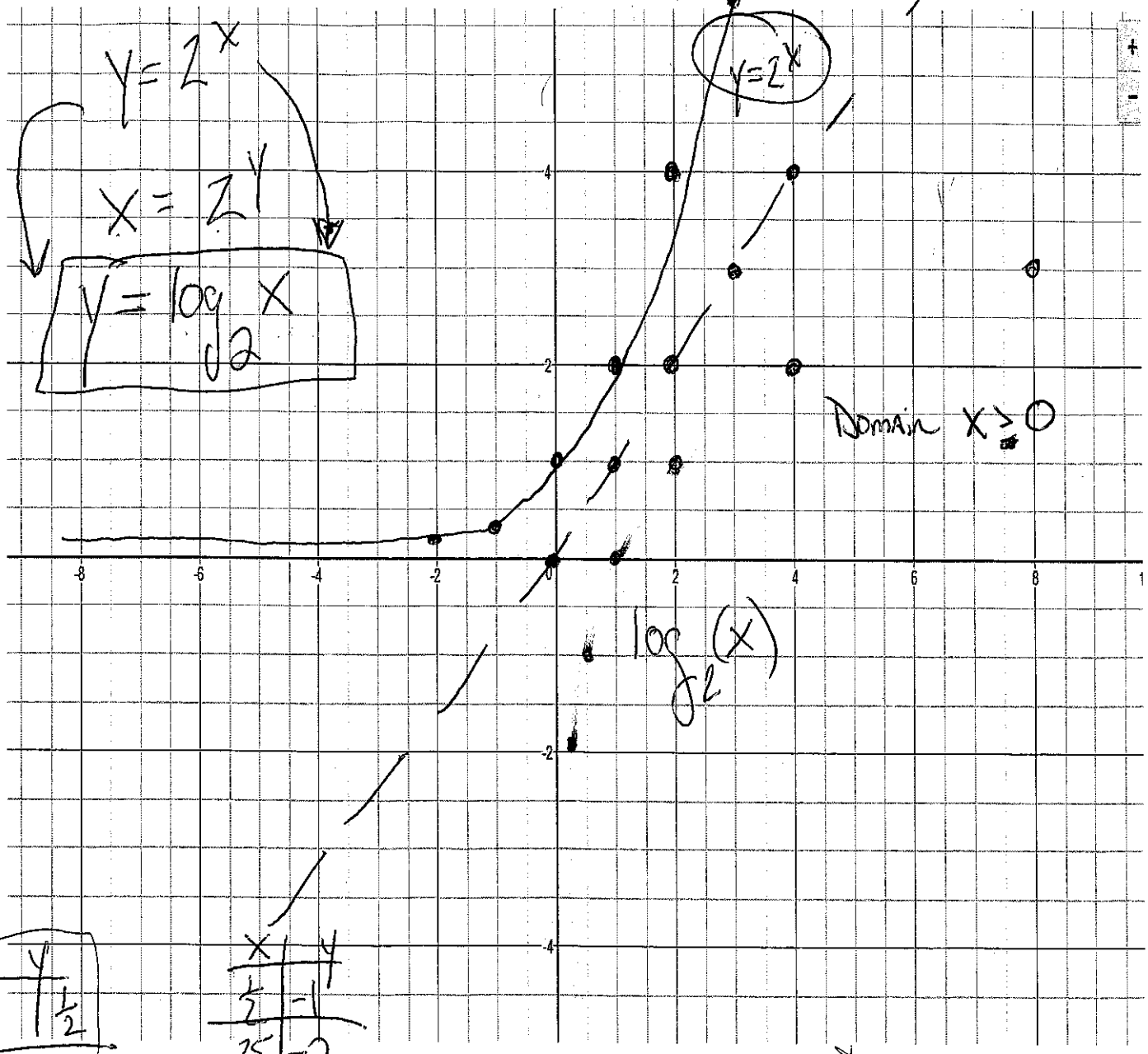
Graphing Assignment: **Carefully graph and see how they are related .**

Question: How are the exponential graph and the Log graph related? You will be comparing $y=2^x$ and $y=\log_2 x$

Step 1: Graph $y=2^x$

Step 2:Find the Inverse of $y=2^x$

Step 3: Enter those in your calculator. Show both tables below and make graphs of each.



X	Y
-1	$\frac{1}{2}$
-2	.25
0	1
1	2
2	4
3	8

X	Y
$\frac{1}{2}$	-1
.25	-2
1	0
2	1
4	2
8	3