Unit 10 Day 1 HW

After checking hw, start the warm-up.

Unit10 Day 1 HW

1. See table and graph on next slide
   $f^{-1}(x) = \log_{\frac{1}{3}} x$

   Domain $(0,\infty)$

   Range $(-\infty, \infty)$

   Original: $y = 0$

   Inverse: $x = 0$

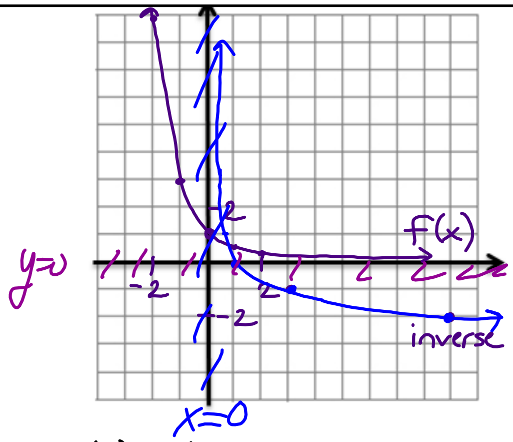
2. See table and graph on the next slide
3. Down 3; x = 0
4. Right 5, Up 2; x = 5
5. Left 2, Down 3; x = -2
6. a

Jan 20-5:35 PM

1. Graph $f(x) = (3)^{-x}$ and its inverse.

x	-2	-1	0	1	2
y	9	3	1	1/3	1/9

x	9	3	1	1/3	1/9
y	-2	-1	0	1	2



What is the equation of the inverse? $f^{-1}(x) = \log_{\frac{1}{3}} x$

What is the domain and range of the inverse?

Domain $(0, \infty)$

Range $(-\infty, \infty)$

What are the asymptotes of the original and inverse equations?

Original $y = 0$

Inverse $x = 0$

Jan 19-10:59 AM

② $f(x) = \log_3 x$

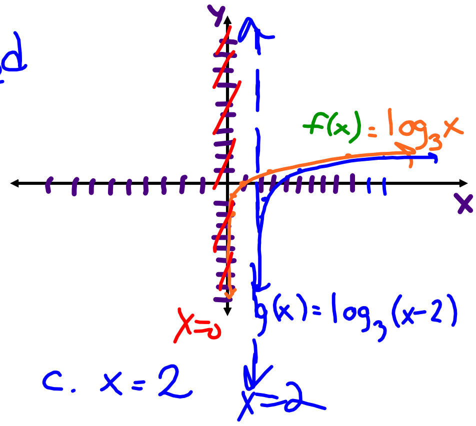
$y = 3^x$

x	-2	-1	0	1	2
y	$\frac{1}{9}$	$\frac{1}{3}$	1	3	9

not graphed

$f(x) = \log_3 x$

x	1/9	1/3	1	3	9
y	-2	-1	0	1	2



c. $x = 2$

b) $g(x) = \log_3(x-2) \rightarrow$ right 2

Jan 23-10:48 AM

In questions 3-5,

a. State the transformation(s) that have occurred.

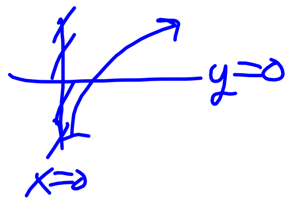
b. State the equation of the asymptote.

3. $y=\log_4 x - 3$
   Down 3
   $x = 0$

4. $y=\log_2(x - 5) + 2$
   Right 5 $x = 5$
   Up 2

5. $y=\log (x + 2) - 3$
   Left 2 $x = -2$
   Down 3

6. Which statement is false about the graph $c(x) = \log_6 x$?
   a. The asymptote has an equation $y = 0$ false $x=0$
   b. The graph has no y-intercept
   c. The domain is the set of positive reals
   d. The range is the set of all real numbers

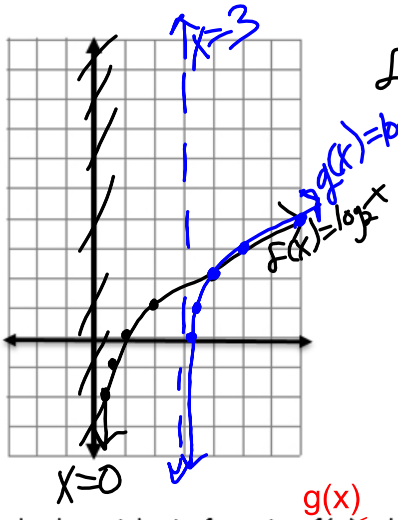


Jan 19-11:00 AM

Solving Exponential and Logarithmic Equations Unit 10 Day 2

Warm-up: On the graph below, plot $\boxed{f(x) = \log_2 x}$ using the values from the previous lesson.

Using these values plot the function ~~f(x)~~ g(x) = $\log_2(x-3) + 2$ → right 3, up 2



$f(x) = \log_2 x$

x	y
1/4	-2
1/2	-1
1	0
2	1
4	2

For the logarithmic function ~~f(x)~~ g(x) = $\log_2(x-3) + 2$, explain why $x = 0$ is not in its domain.

The vertical asymptote moved from x=0 to x=3. So g(x) domain is x>3. x=0 is < 3, not >3. X=0 is not in the g(x) domain.

Jan 19-10:52 AM

Solving Exponential and Logarithmic Equations

Jan 20-6:07 PM

An exponential equation is an equation in which the variable is in the exponent.

When bases are not the same, follow these steps:

Steps:

1. Express each side of the equation in terms of the same base.

2. Set the exponents equal.

3. Solve.

Example:

$2^? = 64$

$2^1 = 2$

$2^2 = 4$

$2^3 = 8$

$2^4 = 16$

$2^5 = 32$

$2^6 = 64$

$2^x = 64$

$\cancel{2}^x = \cancel{2}^6$

$x = 6$

Jan 19-10:55 AM

Solve for x.

$\cancel{8}^4$

1. $3^x = 27$

$3^x = 3^3$

$x = 3$

2. $8^{x+1} = 32$

$(2^3)^{x+1} = 2^5$

$3(x+1) = 5$

$3x + 3 = 5$

$3x = 2$

$x = 2/3$

3. $4^x = 16^{2x-3}$

$4^x = (4^2)^{2x-3}$

$x = 4x - 6$

$+6 \quad -x \qquad -x \quad +6$

$6 = 3x$

$x = 2$

4. $9^{2x+1} = 27$

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

$4x + 2 = 3$

$4x = 1$

$x = 1/4$

5. $125^x = \left(\frac{1}{25}\right)^{4-x}$

$(5^3)^x = \left(\frac{1}{5^2}\right)^{4-x}$

$5^{3x} = (5^{-2})^{4-x}$

$3x = -8 + 2x$

$-2x \qquad -2x$

$x = -8$

Jan 19-10:55 AM

Logarithmic Form of an Equation

equivalent

General Rule: $\log_b c = a \leftrightarrow b^a = c$

$y = 1^x$ ~~$y = (-2)^x$~~

Restrictions b: base > 0 and ≠ 1

c: c > 0

Write in Exponential Form:

1. $\log_2 4 = 2$ $\quad 2^2 = 4$
2. $\log_5 125 = 3$ $\quad 5^3 = 125$
3. $\log_{10} 100 = x$ $\quad 10^x = 100$ $(x=2)$

Write in Log Form:

4. $3^2 = 9$ $\quad 2 = \log_3 9 \quad \log_3 9 = 2$
5. $10^{-1} = .1$ $\quad \log_{10}(.1) = -1$ $\quad .1 = \frac{1}{10} = 10^{-1}$
6. $4^x = 16$ $\quad \log_4(16) = x$

Jan 19-10:56 AM

Solve each equation for x:

Step 1: Put into exponential form

Step 2: Solve for x.

1. $2 = \log_x 16$

$x^2 = 16$

$x = \pm 4$

base > 0, ≠ 1

reject −4

$x = 4$

2. $x = \log_4 64$

$4^x = 64$

$4^x = 4^3$

$x = 3$

3. $2 = \log_8 x$

$8^2 = x$

$x = \{64\}$

4. $\log_3 81 = x$

$3^x = 81$

$3^x = 3^4$

$x = 4$

Jan 19-10:56 AM

Evaluate:

Step 1: Set expression equal to x.

Step 2: Put into exponential form.

Step 3: Solve for x.

Step 4: Check your solution using the log base feature on your graphing calculator.

$\frac{\log 9}{\log 3}$

1. $\log_3 9 = x$

$3^x = 9$, $x = 2$

2. $\log_5 1 = x$

$5^x = 1$ $\quad 5^x = 5^0$

$x = 0$

3. $\log_6 \frac{1}{36} = x$

$6^x = \frac{1}{36}$

$6^x = \frac{1}{6^2}$

$6^x = 6^{-2}$

$x = -2$

4. $\log_3 \sqrt{3} = x$

$3^x = \sqrt{3}$

$3^x = 3^{1/2}$

$x = 1/2$

5. $\log_{27} 3 = x$

$27^x = 3$,

$(3^3)^x = 3^1$

$3x = 1$

$x = 1/3$

6. $\log_{\frac{1}{4}} \frac{1}{16} = x$

$\left(\frac{1}{4}\right)^x = \frac{1}{16}$

$(4^{-1})^x = \frac{1}{4^2}$

$4^{-1 \cdot x} = 4^{-2}$

$-x = -2$

$x = 2$

Jan 19-10:56 AM

Jan 19-11:04 AM