Unit 10 Day 1 HW

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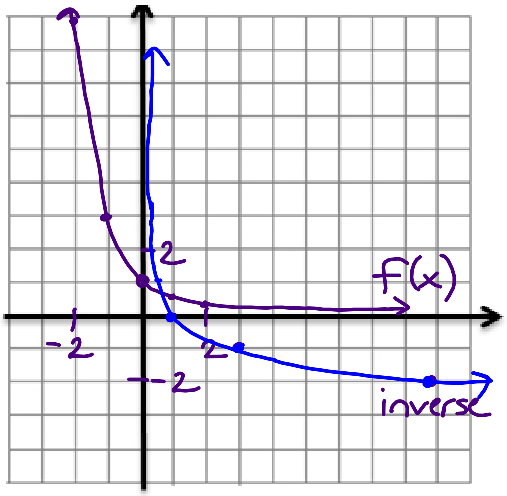
1. See table and graph on next slide
   $f^{-1}(x) = \log_{\frac{1}{3}} x$ $x = \left(\frac{1}{3}\right)^y$
   Domain $(0, \infty)$
   Range $(-\infty, \infty)$
   Original: $y = 0$
   Inverse: $x = 0$

2. See table and graph on the next slide
3. Down 3
4. Right 5 and up 2
5. Left 2 and down 3
6. A
7. a. $3^3 = 27$
   b. $x^4 = 16$
   c. $5^4 = 625$
   d. $7^x = 32$
8. a. $\log_4 256 = b$
   b. $\log_x 17 = 2.1$
   c. $\log_7 1 = 0$
   d. $\log_3 8.2 = x$

1. Graph $f(x) = \left(\frac{1}{3}\right)^x$ 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 $x = 0$

2. $f(x) = \log_3 x$

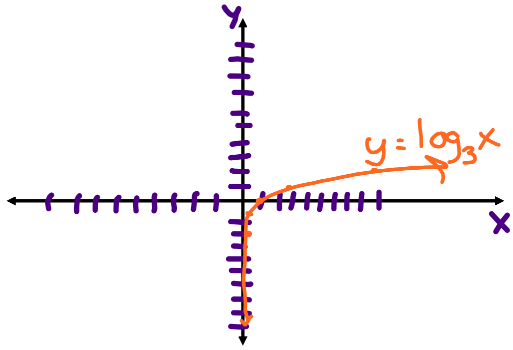
INV: $y = 3^x$

$y=3^x$

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

$f(x)=\log_3 x$

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



3. Down 3

4. Right 5 and up 2

5. Left 2 and down 3

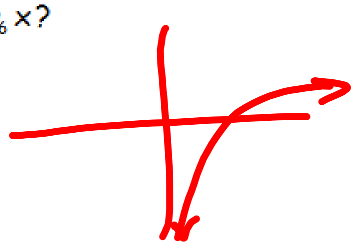
6. Which statement is false about the graph $c(x) = \log_6 x$?

a. The asymptote has an equation ~~$y = 0$?~~ $x=0$

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



7. Write the following in exponential form

a. $\log_3 27 = 3$ $3^3 = 27$

b. $\log_x 16 = 4$ $x^4 = 16$

c. $\log_5 625 = 4$ $5^4 = 625$

d. $\log_7 32 = x$ $7^x = 32$

8. Write the following in logarithmic form

a. $4^b = 256$ $\log_4 256 = b$

b. $x^{2.1} = 17$ $\log_x 17 = 2.1$

c. $7^0 = 1$ $\log_7 1 = 0$

d. $3^x = 8.2$ $\log_3 8.2 = x$

Solving Exponential and Logarithmic Equations

Solving Exponential and Logarithmic Equations Unit 10 Day 2

Warm-Up: Powers to Memorize:

Base	Power	2	3	4	5	6
2		4	8	16	32	64
3		9	27	81	243	
4		16	64	256	x	
5		25	125	625	x	

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:

$2^x = 64$

$2^6 = 64$

sub in

$2^x = 2^6$

$x = 6$

Solve for x.

1. $3^x = 27$

$3^x = 3^3$

$x = 3$

$\{3\}$

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

$8 = 2^3 \quad 32 = 2^5$

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

$2^{3x+3} = 2^5$

$3x+3 = 5$

$3x = 2$

$x = 2/3$

$\{2/3\}$

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

4^2

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

$4^x = 4^{4x-6}$

$x = 4x-6$

$-3x = -6$

$x = 2$

$\{2\}$

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

$3^2 \quad 3^3$

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

$3^{4x+2} = 3^3$

$4x+2 = 3$

$4x = 1$

$x = 1/4$

$\{1/4\}$

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

$5^3 \quad 5^{-2}$

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

$5^{3x} = 5^{-8+2x}$

$3x = -8+2x$

$x = -8$

$\{-8\}$

6. Which of the following represents the solution set to the equation $2^{x^2-3} = 64$? $\leftarrow 2^6$

(1) $\{\pm 3\}$

(2) $\{0, 3\}$

(3) $\{\pm\sqrt{11}\}$

(4) $\{\pm\sqrt{35}\}$

$2^{x^2-3} = 2^6$

$x^2 - 3 = 6$

$\sqrt{x^2} = \sqrt{9}$

$x = \pm 3$

Solve each equation for x:
Step 1: Put into exponential form
Step 2: Solve for x.

1. $2 = \log_x 16$

$x^2 = 16$
$x = \pm 4$ reject -4
$x = 4$ $\{4\}$

2. $x = \log_4 64$

$4^x = 64$
$4^x = 4^3$
$x = 3$ $\{3\}$

3. $2 = \log_8 x$

$8^2 = x$
$64 = x$
$\{64\}$

4. $\log_3 81 = x$

$3^x = 81$
$3^x = 3^4$
$x = 4$ $\{4\}$

Evaluate:

Step 1: Set expression equal to x.

Step 2: Put into exponential form.

Step 3: Solve for x.

1. $\log_3 9 = x$

$3^x = 9$

$x = 2$ 2

2. $\log_5 1 = x$

$5^x = 1$

0

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

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

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

-2

4. $\log_5 125 = x$

$5^x = 125$

3

5. $\log_2 2 = x$

$2^x = 2$

1

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

$3^x = \sqrt{3}$

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

$1/2$

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

$27^x = 3$

$\sqrt[3]{27} = 3$

$27^{1/3} = 3$

$1/3$

8. $\log_{1/4} 1/16 = x$

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

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