2.10 Inverses of Exponential Functions

AP Precalculus

2.10 Practice

Directions: Describe the function, f(x) (exponential, logarithmic, or neither), how you know why it is that function and then find points for its inverse, g(x).

1)

X	f(x)
3	8
4	16
5	32
6	64

X	G(x)
8	3
16	4
32	5
64	6

EXPONENTIAL BECAUSE THE Y-VALUES ARE BEING MULTIPLIED.

2)

X	f(x)
1/9	-2
1/3	-1
1	0
3	1

X	G(x)
-2	1/9
-1	1/3
0	1
1	3

LOGARITHMIC - THE X-VALUES ARE BEING MULTIPLIED.

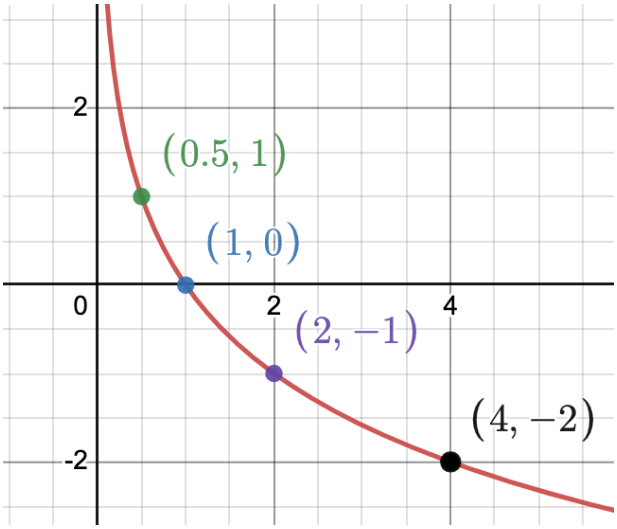
3.

X	f(x)
0	1
1	4
2	7
3	10

X	G(x)
1	0
4	1
7	2
16	3

Neither - BOTH X- AND Y-VALUES ARE BEING ADDED!

4.



X	G(x)
1	.5
0	1
-1	2
-2	4

LOGARITHMIC - THE X-VALUES ARE BEING MULTIPLIED.

Directions: Determine if f(x) and g(x) are inverses.

5. $f(x) = 2 \cdot \log_2 x$
$g(x) = 2^{2x}$

$f(g(x))$
$2 \cdot \log_2(2^{2x})$
$2 \cdot 2x$
$4x$

$g(f(x))$
$2^{2(2\log_2 x)}$
$2^{4\log_2 x}$
$2^{\log_2 x^4}$
x^4

NOT INVERSES

6. $f(x) = 10^{.25x}$
$g(x) = 4 \cdot \log x$

$f(g(x))$
$10^{.25(4\log x)}$
$10^{\log x}$
x

$g(f(x))$
$4 \cdot \log(10^{.25x})$
$4 \cdot .25x$
x

INVERSES

7. $f(x) = 5^{\frac{x}{8}}$
$g(x) = 8 \cdot log_5 x$

$f(g(x))$
$5^{\frac{x \cdot \log_5 x}{8}}$
$5^{\log_5 x}$
x

$g(f(x))$
$8 \cdot \log_5 5^{\frac{x}{8}}$
$x \cdot \frac{1}{8}$
x

INVERSE

Directions: Find the inverse of the given function.	
8. $h(x) = 4^{5x}$	9. $m(x) = 5 \cdot log_2 x$
$x = 4^{5y}$ $\log_4 x = \log_4 4^{5y}$ $\frac{\log_4 x}{5} = \frac{5y}{5}$ $\frac{\log_4 x}{5} = \frac{1}{5} \cdot \log_4 x = y = h^{-1}(x)$	$\frac{x}{5} = \frac{5}{5} \cdot \log_2 y$ $2^{\frac{1}{5}x} = \log_2 y$ $2^{\frac{1}{5}x} = y = m^{-1}(x)$
10. $a(x) = \frac{1}{4} \cdot log_8 x$	11. $b(x) = 10^{\frac{3}{4}x}$
$4x = 4(\frac{1}{4} \cdot \log_8 y)$ $8^{4x} = \log_8 y$ $8^{4x} = y = a^{-1}(x)$	$x = 10^{3/4y}$ $\log x = \log 10^{3/4y}$ $\frac{4}{3} \cdot \log x = \frac{3}{4} y (\frac{4}{3})$ $\frac{4}{3} \cdot \log x = y = b^{-1}(x)$

2.10 Inverses of Exponential Functions

2.10 Test Prep

Which of the following represent a possible function that is the inverse of $f(x) = 0.25^x$.

THIS IS

a. $f(x) = .25^x$

X	f(x)
-3	64
-2	16
-1	4
0	1

b. $f^{-1}(x)$

X	f(x)
4	-1
1	0
$\frac{1}{4}$	1
$\frac{1}{16}$	2

MULTIPLICATION IS ON THE X-VALUES

c. $f^{-1}(x)$

x values increase multiplicatively

THIS IS

d. $f(x) = .25^x$