

F.BF.B.5: Inverse of Functions

1 If $f(x) = a^x$ where $a > 1$, then the inverse of the function is

1) $f^{-1}(x) = \log_x a$

3) $f^{-1}(x) = \log_a x$

2) $f^{-1}(x) = a \log x$

4) $f^{-1}(x) = x \log a$

2 The inverse of a function is a logarithmic function in the form $y = \log_b x$. Which equation represents the original function?

1) $y = b^x$

3) $x = b^y$

2) $y = bx$

4) $by = x$

3 What is the inverse of the function $y = \log_3 x$?

1) $y = x^3$

3) $y = 3^x$

2) $y = \log_x 3$

4) $x = 3^y$

4 What is the inverse of the function $f(x) = \log_4 x$?

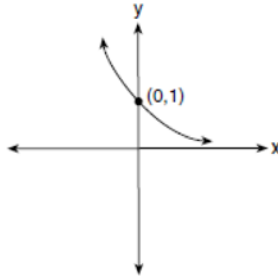
1) $f^{-1}(x) = x^4$

3) $f^{-1}(x) = \log_x 4$

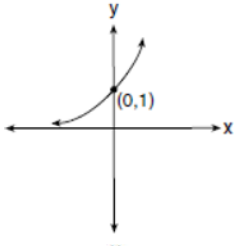
2) $f^{-1}(x) = 4^x$

4) $f^{-1}(x) = -\log_x 4$

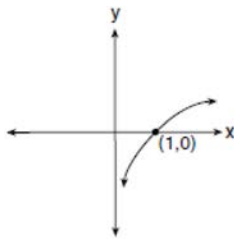
5 The graph of $f(x)$ is shown below. Which graph represents $f^{-1}(x)$?



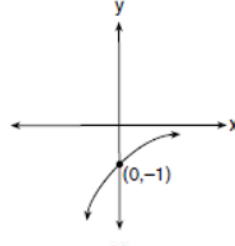
1)



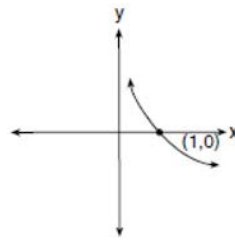
2)



3)

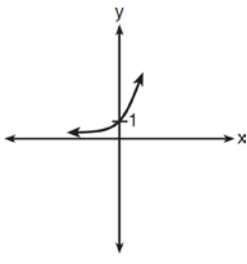


4)

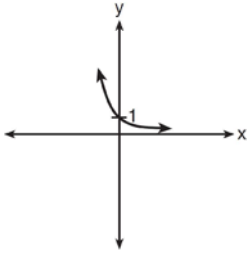


6 Which sketch shows the inverse of $y = a^x$, where $a > 1$?

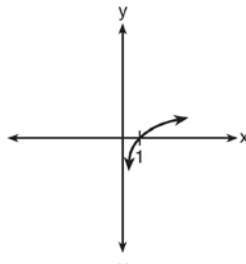
1)



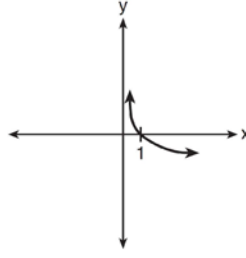
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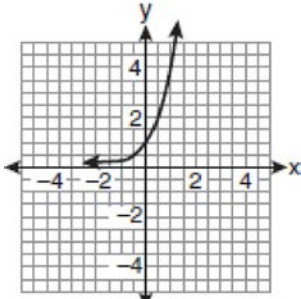
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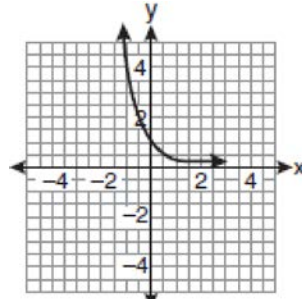
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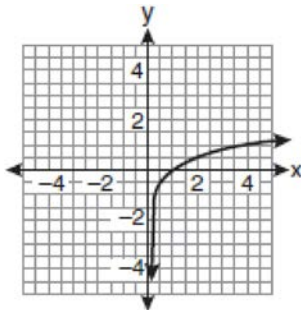
7 If a function is defined by the equation $f(x) = 4^x$, which graph represents the inverse of this function?



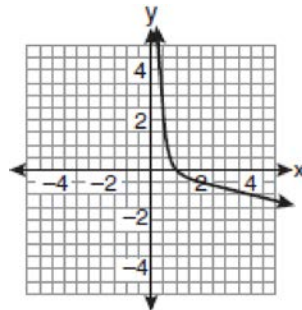
1)



3)

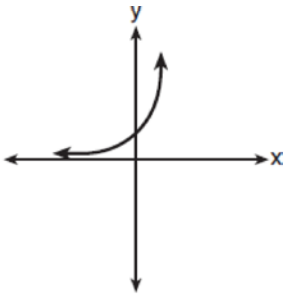


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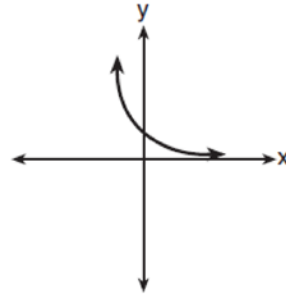


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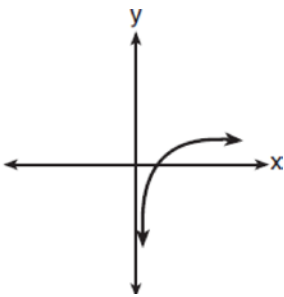
8 Which sketch best represents the graph of $x = 3^y$?



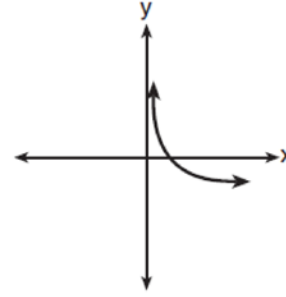
1)



3)



2)



4)

9 Which two functions are inverse functions of each other?

1) $f(x) = \sin x$ and $g(x) = \cos(x)$

3) $f(x) = e^x$ and $g(x) = \ln x$

2) $f(x) = 3 + 8x$ and $g(x) = 3 - 8x$

4) $f(x) = 2x - 4$ and $g(x) = -\frac{1}{2}x + 4$

10 Which equation defines a function whose inverse is *not* a function?

1) $y = |x|$

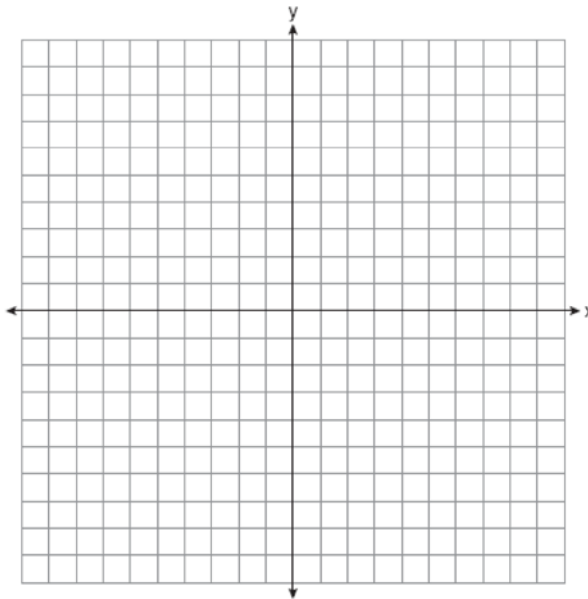
3) $y = 3x + 2$

2) $y = -x$

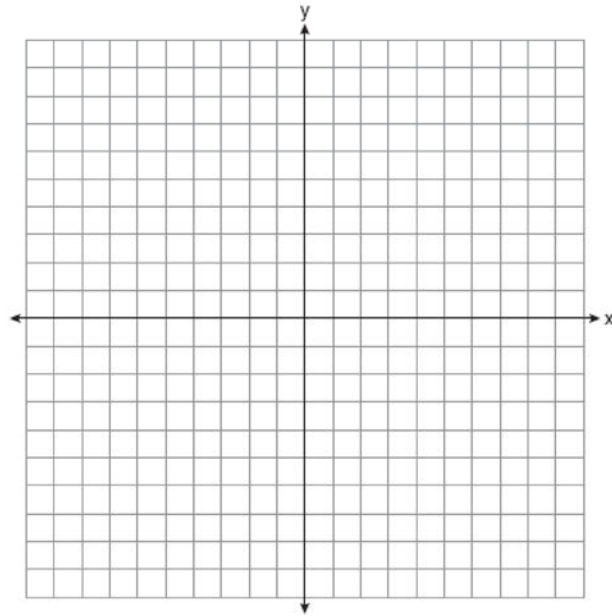
4) $y = 2^x$

11 Consider the function $f(x) = 2^x$. Is $f(x)$ an even function? Justify your answer. Write an equation for $g(x)$, the function that results after $f(x)$ is shifted up 5 units. Write an equation for $h(x)$, the inverse of $g(x)$.

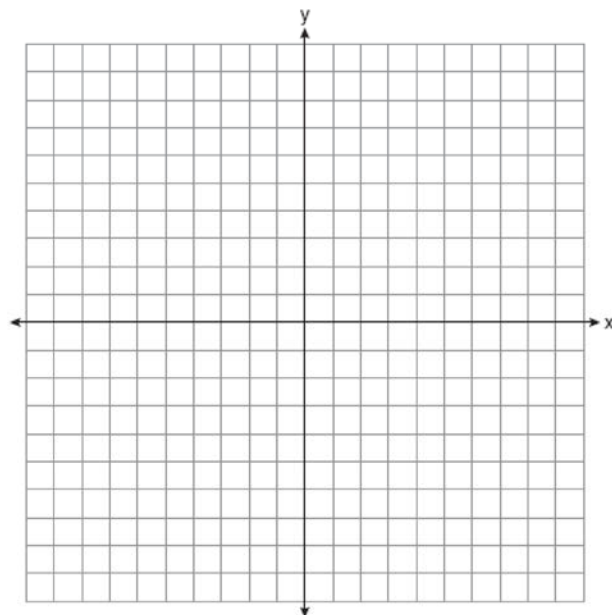
12 Sketch the graph of the functions $f(x) = 3^x$ and $g(x) = \log_3 x$. Considering the graphs, describe the relationship between $f(x)$ and $g(x)$. Specify the domain and the range of g .



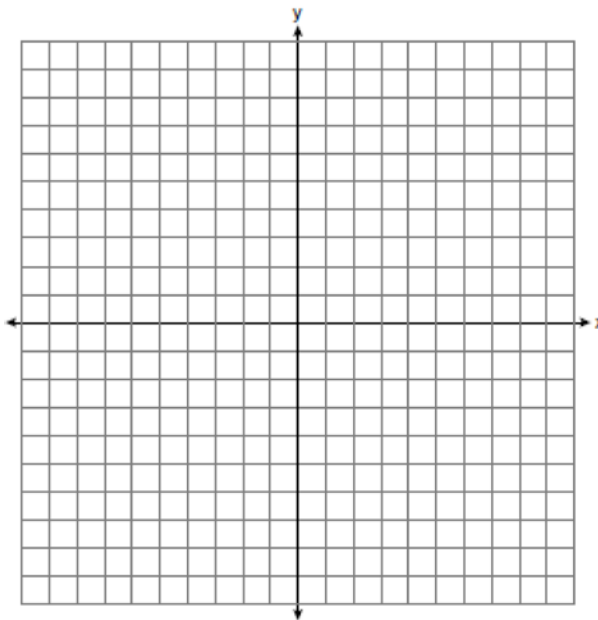
- 13 Sketch below the graph of $y = 4^x$. On the same set of axes, sketch the graph of $y = \log_4 x$.



- 14 Sketch and label the graph of the equation $y = \log x$ for all values of x in the interval $0.1 \leq x \leq 10$. On the same set of axes, reflect the graph drawn in the line $y = x$, and label it c . What is the equation of c ?



15 Sketch and label the graph of $y = 2^x$.



The graph of $y = 2^x$ is subject to each of these transformations:

- (1) reflection in the y -axis
- (2) reflection in the line $y = x$
- (3) translation: $(x,y) \rightarrow (x,y + 1)$

Next to the appropriate numeral below, write the letter of the equation, chosen from the list below, that best described the image of $y = 2^x$ under each of the numbered transformations.

Equations

- (a) $y = \log_2 x$
- (b) $y = -2^x$
- (c) $y = 2^{-x}$
- (d) $y = 2^x + 1$

- (1)
- (2)
- (3)

F.BF.B.5: Inverse of Functions**Answer Section**

1 ANS: 3 REF: 011917aai

2 ANS: 1

$$y = \log_b x$$

$$x = b^y$$

$$y = b^x$$

REF: 060115b

3 ANS: 3 REF: 011708aai

4 ANS: 2 REF: 061521a2

5 ANS: 4 REF: 011727a2

6 ANS: 3 REF: 011422a2

7 ANS: 2

$$f^{-1}(x) = \log_4 x$$

REF: fall0916a2

8 ANS: 2 REF: 081816aai

9 ANS: 3 REF: 081027a2

10 ANS: 1 REF: 068932aiii

11 ANS:

No, because $f(-x) = 2^{-x}$ $g(x) = f(x) + 5$ $y = 2^x + 5$

$$2^{-x} \neq 2^x \qquad x = 2^y + 5$$

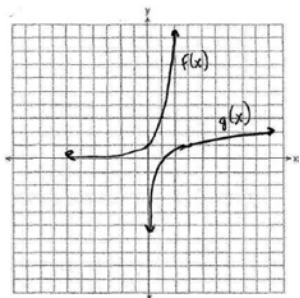
$$\log(x - 5) = \log 2^y$$

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

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

REF: 082435aai

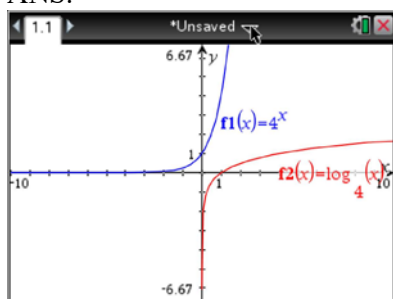
12 ANS:



$f(x)$ and $g(x)$ are inverses of each other. The domain of g is the positive reals and the range of g is the reals.

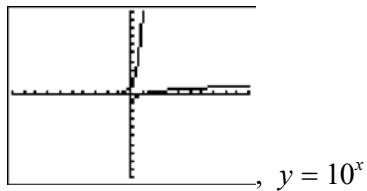
REF: fall9927b

13 ANS:



REF: 069039siii

14 ANS:



REF: 019442siii

15 ANS:

c, a, d

REF: 088539siii