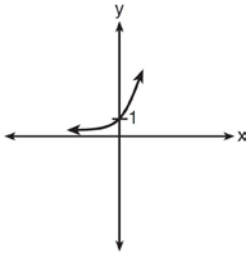
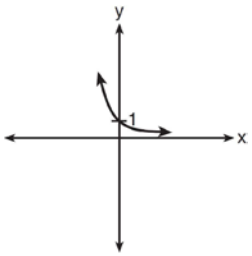
F.IF.C.7: Graphing Logarithmic Functions

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

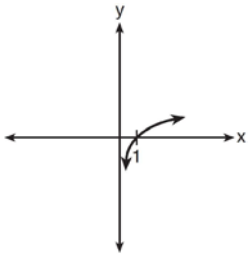
1)



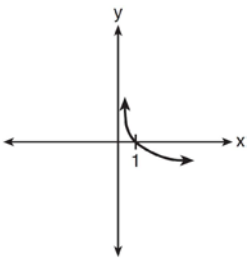
2)



3)

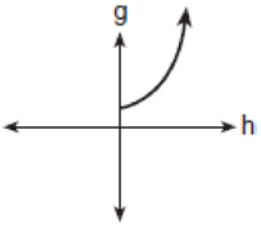


4)

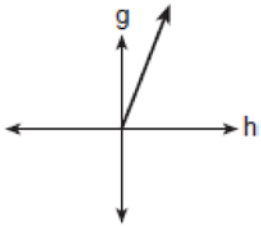


2 The cells of a particular organism increase logarithmically. If g represents cell growth and h represents time, in hours, which graph best represents the growth pattern of the cells of this organism?

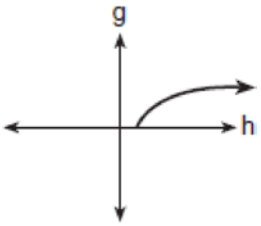
1)



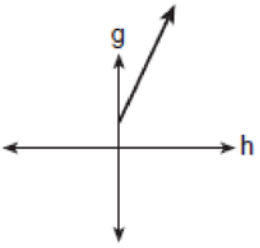
2)



3)



4)

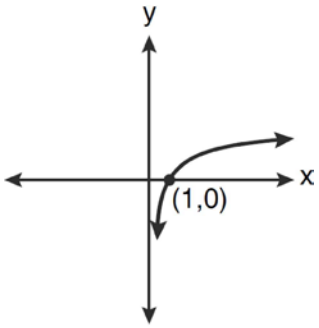


3 The graph of $y = \log x$ lies in Quadrant(s)

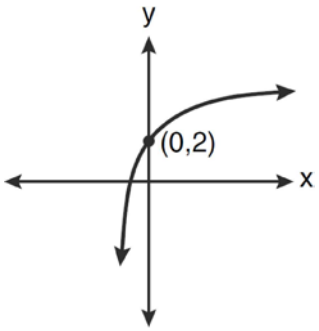
1) I and II
2) II and III
3) III and IV
4) I and IV

4 Which graph represents the function $\log_2 x = y$?

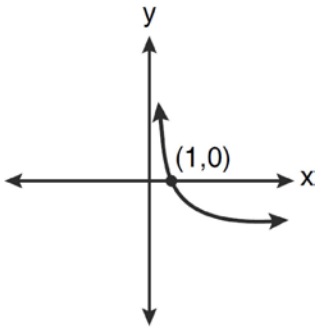
1)



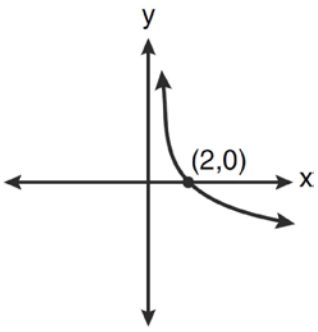
2)



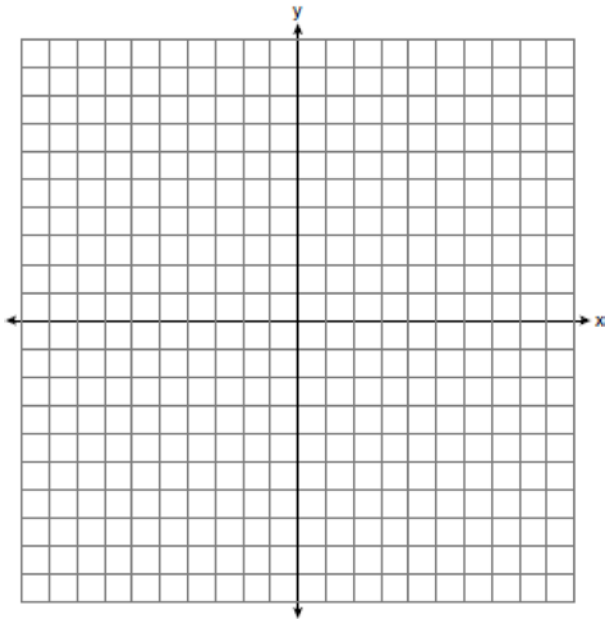
3)



4)



5 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) $y = \log_2 x$

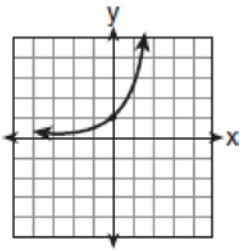
(b) $y = -2^x$

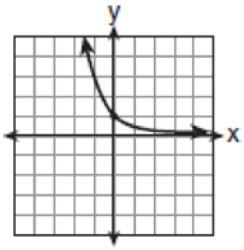
(c) $y = 2^{-x}$

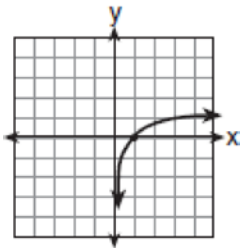
(d) $y = 2^x + 1$

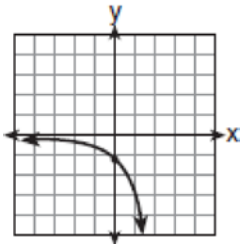
(1)
(2)
(3)

6 Which graph represents the inverse of the equation $y = 3^x$?

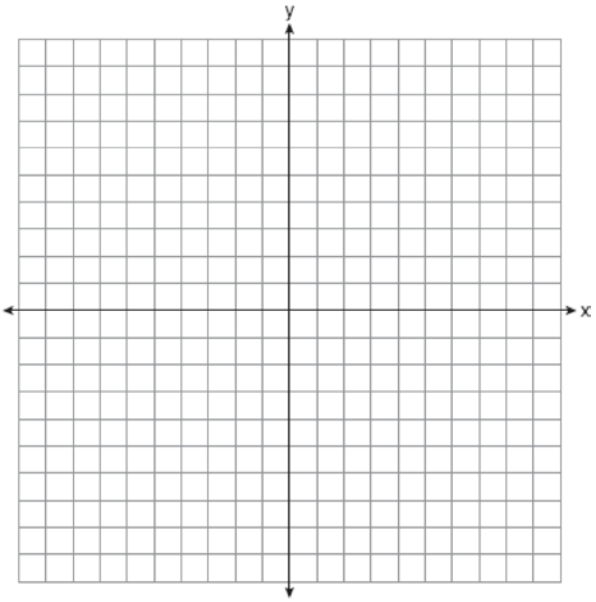
1) 

2) 

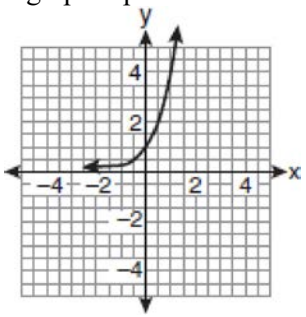
3) 

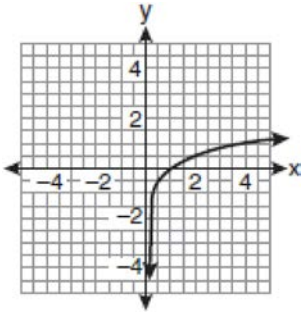
4) 

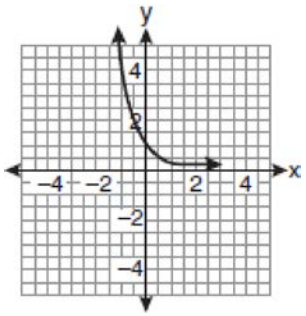
7 Sketch the graph of the functions $f(x) = 3^x$ and $g(x) = \log_3 x$. Considering the graphs, describe the relationship between $f(x)$ and $g(x)$. Specify the domain and the range of g.

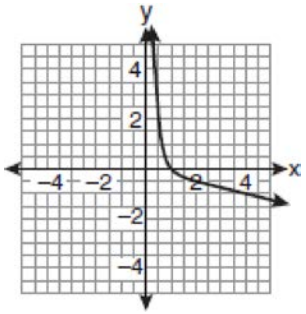


8 If a function is defined by the equation $f(x) = 4^x$, which graph represents the inverse of this function?

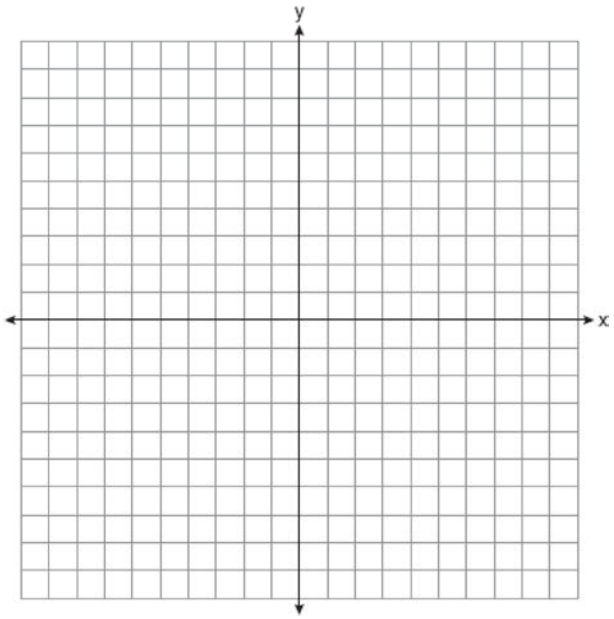
1) 

2) 

3) 

4) 

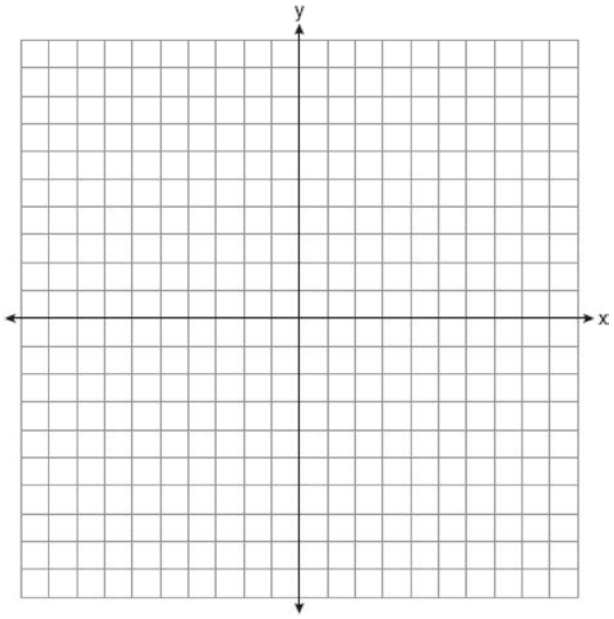
9 Sketch below the graph of $y = 4^x$. On the same set of axes, sketch the graph of $y = \log_4 x$.



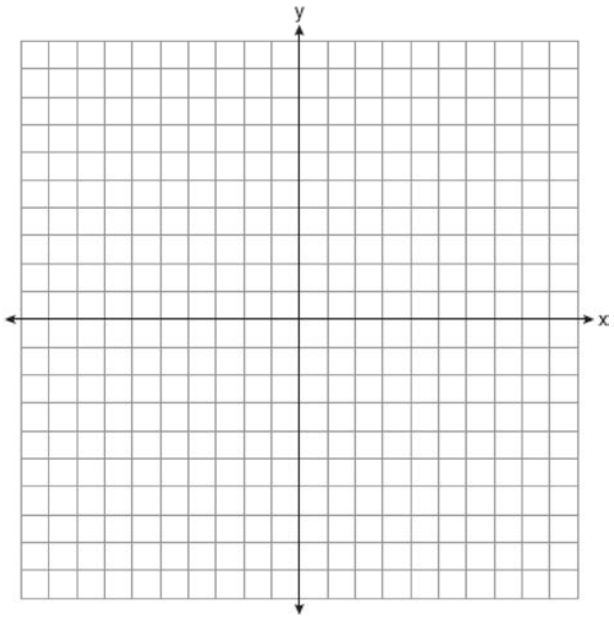
10 Which statement about the graph of $c(x) = \log_6 x$ is *false*?

1) The asymptote has equation $y = 0$.
2) The graph has no y-intercept.
3) The domain is the set of positive reals.
4) The range is the set of all real numbers.

11 Sketch and label the graph of the equation $y = \log x$ for all values of x in the interval $0.1 \le x \le 10$. 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?

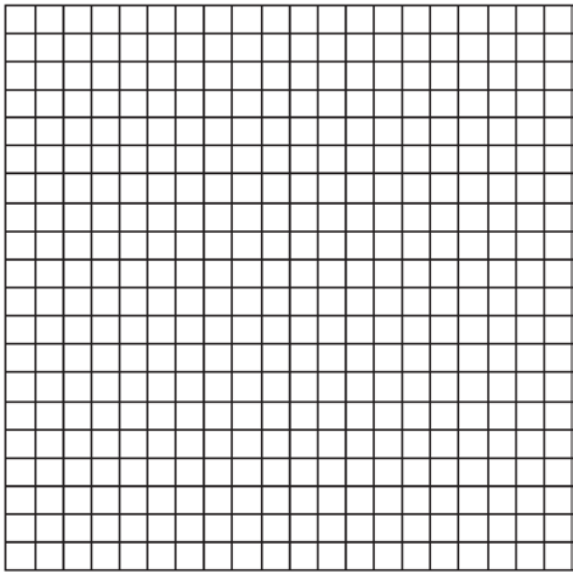


12 Graph $y = \log_2(x + 3) - 5$ on the set of axes below. Use an appropriate scale to include *both* intercepts.



Describe the behavior of the given function as x approaches -3 and as x approaches positive infinity.

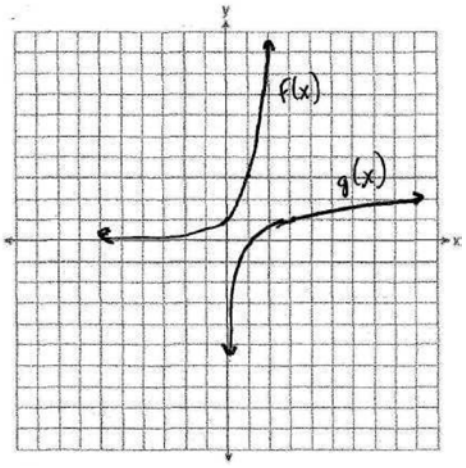
13 A hotel finds that its total annual revenue and the number of rooms occupied daily by guests can best be modeled by the function $R = 3\log(n^2 + 10n)$, $n > 0$, where R is the total annual revenue, in millions of dollars, and n is the number of rooms occupied daily by guests. The hotel needs an annual revenue of \$12 million to be profitable. Graph the function on the accompanying grid over the interval $0 < n \le 100$. Calculate the minimum number of rooms that must be occupied daily to be profitable.



F.IF.C.7: Graphing Logarithmic Functions
Answer Section

1 ANS: 3 REF: 011422a2
2 ANS: 3 REF: 010420b
3 ANS: 4 REF: 018535siii
4 ANS: 1 REF: 061211a2
5 ANS:
c, a, d

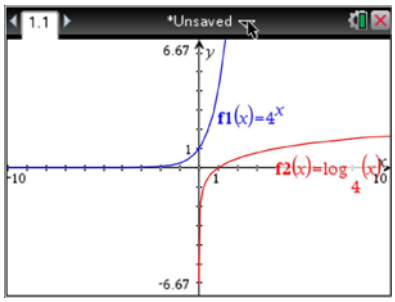
REF: 088539siii
6 ANS: 3 REF: 080329siii
7 ANS:



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.

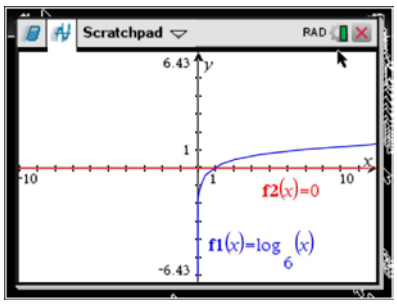
REF: fall9927b
8 ANS: 2
$f^{-1}(x) = \log_4 x$

REF: fall0916a2
9 ANS:



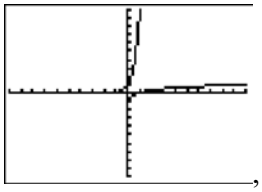
REF: 069039siii

10 ANS: 1



REF: 061618aii

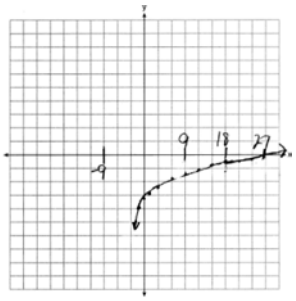
11 ANS:



, $y = 10^x$

REF: 019442siii

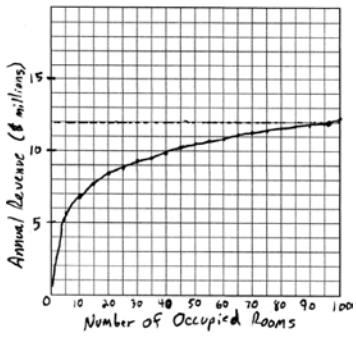
12 ANS:



As $x \to -3, y \to -\infty$. As $x \to \infty, y \to \infty$.

REF: 061735aii

13 ANS:



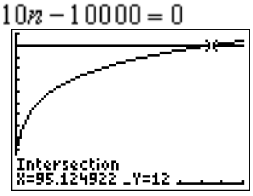
96

$$3\log(n^2+10n)=12$$
$$\log(n^2+10n)=4$$
$$n^2+10n=10^4$$
$$n^2+10n-10000=0$$

$$x=\frac{-10\pm\sqrt{10^2-4(-10000)}}{2}$$

$$x=\frac{-10+\sqrt{40100}}{2}\approx 95.1$$

. 96 rooms must be occupied. The other root is negative.



REF: 080530b