

Name _____

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.**Find the composition.**

1) $f(x) = 5x + 9$; $g(x) = \frac{2}{x}$

1) _____

Find $(g \circ f)(3)$.

2) $f(x) = \sqrt{x}$; $g(x) = 4x - 14$

2) _____

Find $(f \circ g)(7)$.**Find the indicated composition.**

3) $f(x) = x^2 + 6$; $g(x) = 5x + 1$

3) _____

Find $(f \circ g)(x)$.

4) $f(x) = \frac{x-7}{3}$; $g(x) = 3x + 7$

4) _____

Find $(g \circ f)(x)$.**Decide whether the given functions are inverses.**

5) $f = \{(1, 3), (2, 6), (3, 9), (4, 12), (5, 15)\}$

5) _____

$g = \{(3, 1), (-6, 2), (9, 3), (12, 4), (15, 5)\}$

6) $f = \{(5, 16), (4, -5), (-5, 20), (16, 5)\}$

6) _____

$g = \{(16, 5), (-5, 4), (20, -5), (5, 16)\}$

Determine whether or not the given functions are inverses of each other.

7) $f(x) = \frac{-6-x}{x}$, $g(x) = \frac{-6}{x+1}$

7) _____

8) $f(x) = \frac{x-4}{8}$, $g(x) = -8x + 4$

8) _____

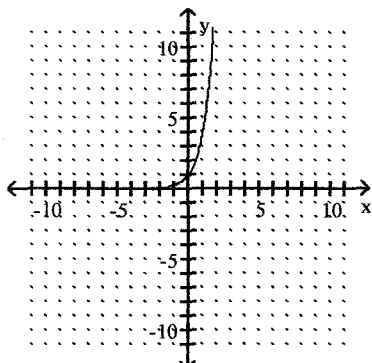
9) $f(x) = x^3 + 7$, $g(x) = \sqrt[3]{x-7}$

9) _____

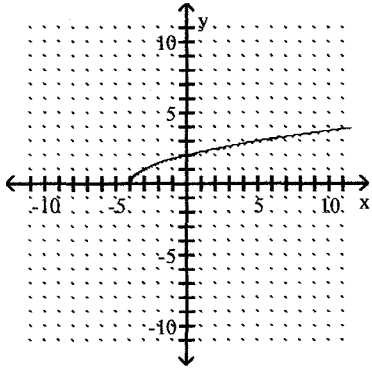
Use the graph of f to sketch a graph of the inverse of f using a dashed curve.

10)

10) _____



12)



12) _____

Find $f^{-1}(x)$ for the following one-to-one function f .

13) $f(x) = x^3 - 4$

13) _____

14) $f(x) = \sqrt{x - 3}$

14) _____

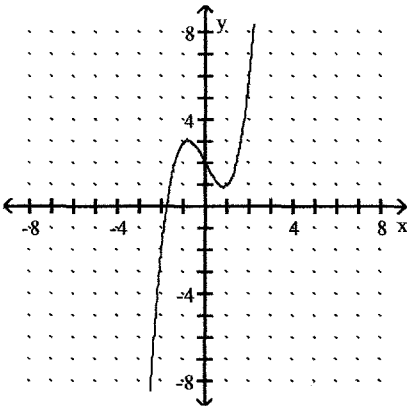
15) $f(x) = \frac{x - 10}{x - 6}$

15) _____

Determine whether or not the function is one-to-one.

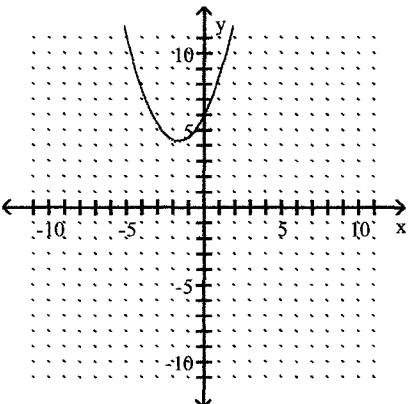
16)

16) _____



17)

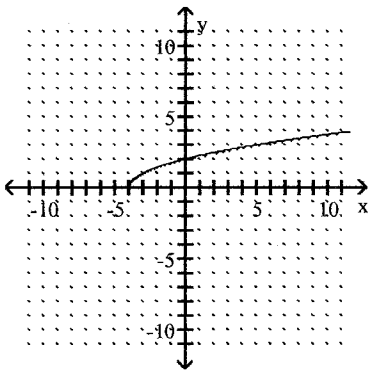
17) _____



18)

18) _____

12)



12) _____

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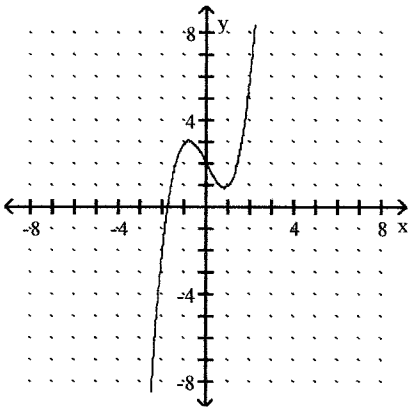
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15) _____

Determine whether or not the function is one-to-one.

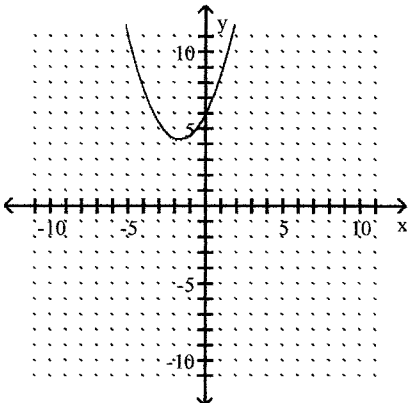
16)

16) _____



17)

17) _____



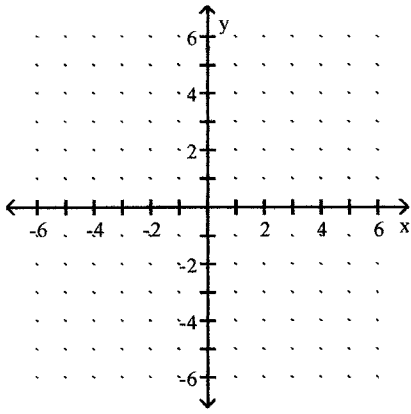
18)

18) _____

↑ y

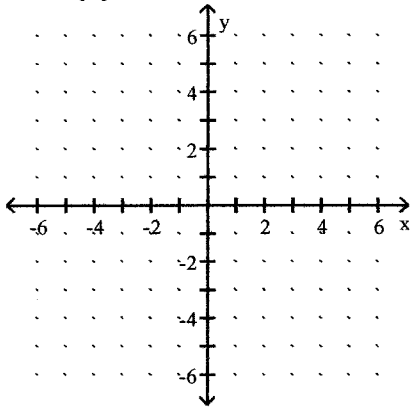
Graph.

19) $f(x) = 2^x$



19) _____

20) $f(x) = \left(\frac{1}{2}\right)^x$



20) _____

Solve the equation.

21) $4^x = 32(2x - 2)$

21) _____

22) $3(6 - 3x) = \frac{1}{27}$

22) _____

23) $5^x = \frac{1}{25}$

23) _____

Write in logarithmic form.

24) $5^3 = 125$

24) _____

Solve.

25) $\log_3 x + 4 = 7$

25) _____

26) $\frac{1}{2} \log_2 x + 8 = 7$

26) _____

Write in exponential form.

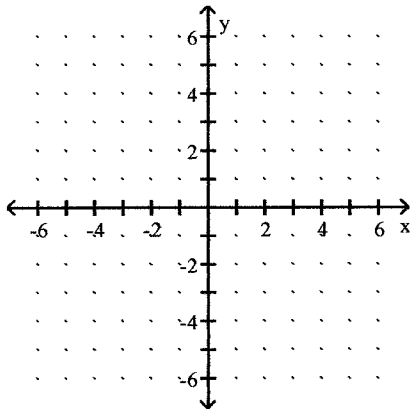
27) $\log_e 41 = 3.714$

27) _____

ESSAY. Write your answer in the space provided or on a separate sheet of paper.

Graph.

28) $f(x) = \log_2 x$



SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Express as a sum, difference, and product of logarithms, without using exponents.

29) $\log_b \frac{m^3 p^5}{n^6 b^9}$

29) _____

30) $\log_b \sqrt[4]{\frac{x^6 b^7}{y^8 z^{14}}}$

30) _____

Express as a single logarithm and, if possible, simplify.

31) $\log_b x^5 - 2 \log_b \sqrt{x}$

31) _____

32) $\log_b 5x + 2(\log_b x - \log_b y)$

32) _____

Using a calculator, evaluate to four decimal places.

33) $\log 0.67$

33) _____

34) $\ln 13,200,000$

34) _____

Find the exact value of the logarithm using $\log_b b^x = x$.

35) $\ln \sqrt[4]{e}$

35) _____

36) $\log 1000$

36) _____

37) $\log 0.00001$

37) _____

Solve the problem.

38) The intensity of a certain noise is $8.01 \times 10^{-7} \text{ W/cm}^2$. How loud, in decibels, is this sound level? Use the formula $D = 10 \log (I/I_0)$, where $I_0 = 10^{-16} \text{ W/cm}^2$. (Round to the nearest decibel.)

38) _____

Solve the equation.

42) $4^x = 11$ (Round to the nearest hundredth.)

42) _____

43) $4^{(7 - 3x)} = \frac{1}{16}$

43) _____

Solve the exponential equation.

44) $e^{-0.2t} = 0.15$

44) _____

Solve the logarithmic equation.

45) $\log(x + 3) = 1 - \log x$

45) _____

46) $\log_4(x - 5) + \log_4(x - 5) = 1$

46) _____

47) $\log(x + 10) - \log(x + 4) = \log x$

47) _____

Solve.

48) How long will it take for the population of a certain country to double if its annual growth rate is 7.9%? (Round to the nearest year.)

48) _____

Solve the problem.

49) How long will it take a sample of radioactive substance to decay to half of its original amount, if it decays according to the function $A(t) = 400e^{-0.072t}$, where t is the time in years? Round to the nearest hundredth year.

49) _____

Find the logarithm using the change-of-base formula.

50) $\log_4 24.11$

50) _____