HW # 6 Exponential and Logarithmic Functions Date:_____ Name_____

Find the inverse of the one–to–one function.

1) $f(x) = \frac{3x - 5}{4}$ 1) _____

A) $f^{-1}(x) = \frac{4x - 5}{3}$ B) $f^{-1}(x) = \frac{4}{3x - 5}$ C) $f^{-1}(x) = \frac{4x + 5}{3}$ D) $f^{-1}(x) = \frac{4}{3x + 5}$

2) $f(x) = \sqrt[3]{x + 6}$ 2) _____

A) $f^{-1}(x) = x - 6$ B) $f^{-1}(x) = x^3 - 6$ C) $f^{-1}(x) = \frac{1}{x^3 - 6}$ D) $f^{-1}(x) = x^3 + 36$

Determine whether the functions f and g are inverses of each other.

3) $f(x) = 6x + 2;\ g(x) = \frac{x - 2}{6}$ 3) _____

A) Yes B) No

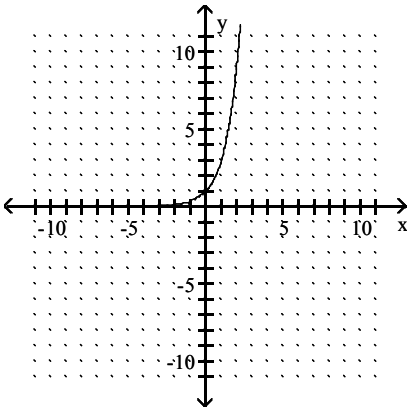
4) $f(x) = 3x + 3;\ g(x) = \frac{x + 3}{3}$ 4) _____

A) Yes B) No

Graph the exponential function.

5) $f(x) = 3^x$ 5) _____

A)



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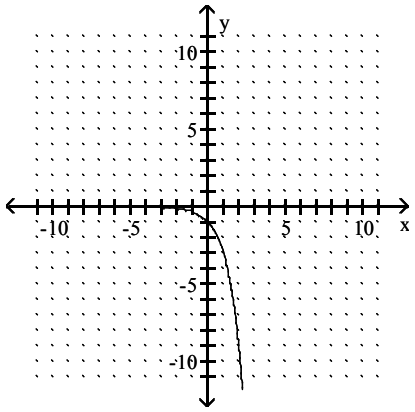

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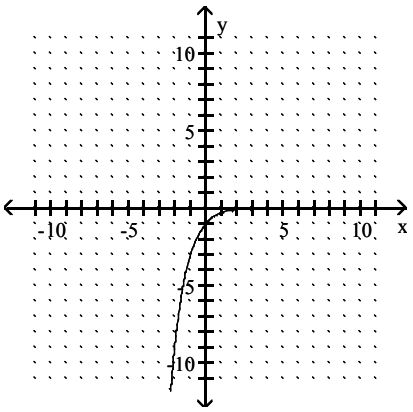

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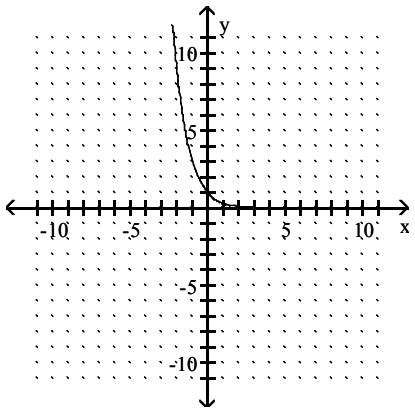


Find the inverse of the one–to–one function.

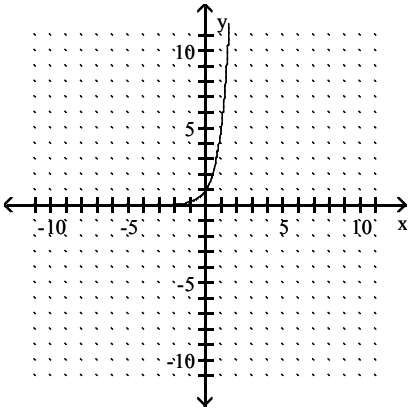
6) $f(x) = 3x + 5$ 6) _____

A) $f^{-1}(x) = -\frac{x + 3}{5}$ B) $f^{-1}(x) = \frac{x + 5}{3}$ C) $f^{-1}(x) = -\frac{x - 5}{3}$ D) $f^{-1}(x) = \frac{x - 5}{3}$

Graph the exponential function.

7) $f(x) = \left(\frac{1}{5}\right)^x$ 7) _____

A)



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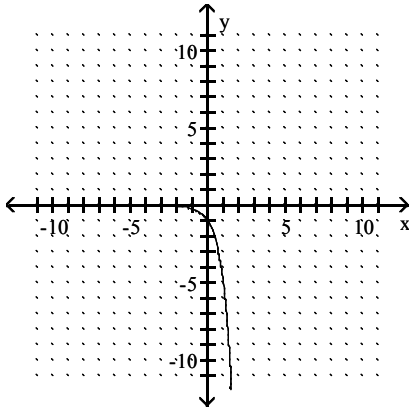

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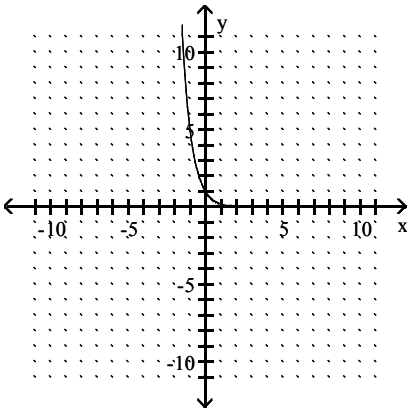

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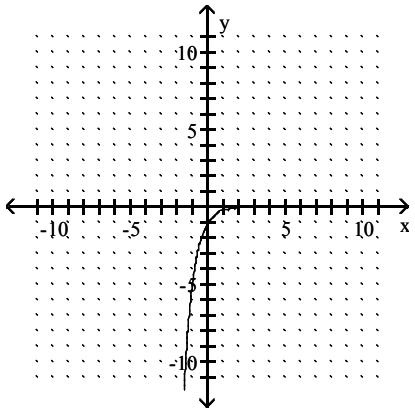


Solve the equation.

8) $5^x = 625$ 8) _____

A) 125 B) 4 C) 3 D) 5

9) $2^{-x} = \frac{1}{8}$ 9) _____

A) 3 B) $\frac{1}{3}$ C) $\frac{1}{4}$ D) –3

10) $3^{(3x - 6)} = 27$ 10) _____

A) 9 B) 3 C) –3 D) $\frac{1}{9}$

11) $4^{(9 - 2x)} = 4$ 11) _____

A) –4 B) 3 C) 5 D) 4

Solve.

12) Four bacteria are placed in a petri dish. The population will double every day. The formula for the number of bacteria in the dish on day t is

$$N(t) = 4(2)^t$$

where t is the number of days after the four bacteria are placed in the dish. How many bacteria are in the dish eight days after the four bacteria are placed in the dish? 12) _____

A) 1024 B) 256 C) 64 D) 14

13) The rabbit population in a forest area grows at the rate of 9% monthly. If there are 160 rabbits in September, find how many rabbits (rounded to the nearest whole number) should be expected by next September. Use $y = 160(2.7)^{0.09t}$. 13) _____

A) 467 B) 455 C) 468 D) 481

Write as an exponential equation.

14) $\log_5 25 = 2$ 14) _____

A) $5^{25} = 2$ B) $25^2 = 5$ C) $2^5 = 25$ D) $5^2 = 25$

15) $\log_2 \frac{1}{8} = -3$ 15) _____

A) $2^{-3} = \frac{1}{8}$ B) $2^8 = 3$ C) $(\frac{1}{8})^3 = 2$ D) $3^2 = \frac{1}{8}$

16) $\log_{10} 100{,}000 = 5$ 16) _____

A) $100{,}000^{-5} = 10$ B) $5^{10} = 100{,}000$ C) $10^{-5} = 100{,}000$ D) $10^5 = 100{,}000$

17) $\log_{10} \sqrt{10} = \frac{1}{2}$ 17) _____

A) $10^{\sqrt{10}} = \frac{1}{2}$ B) $\left(\frac{1}{2}\right)^{10} = \sqrt{10}$ C) $\sqrt{10}^{\frac{1}{2}} = 10$ D) $10^{\frac{1}{2}} = \sqrt{10}$

Write as a logarithmic equation.

18) $5^2 = 25$ 18) _____

A) $\log_5 2 = 25$ B) $\log_5 25 = 2$ C) $\log_2 25 = 5$ D) $\log_{25} 5 = 2$

19) $3^2 = 9$ 19) _____

A) $\log_3 2 = 9$ B) $\log_2 9 = 3$ C) $\log_9 3 = 2$ D) $\log_3 9 = 2$

20) $5^{-2} = \frac{1}{25}$ 20) _____

A) $\log_{-2} \frac{1}{25} = 5$ B) $\log_5 -2 = \frac{1}{25}$ C) $\log_5 \frac{1}{25} = -2$ D) $\log_{1/25} 5 = -2$

21) $7^{1/5} = \sqrt[5]{7}$ 21) _____

A) $\log_{1/5} \sqrt[5]{7} = 7$ B) $\log_7 \frac{1}{5} = \sqrt[5]{7}$ C) $\log_7 \sqrt[5]{7} = \frac{1}{5}$ D) $\log_{1/5} 7 = \sqrt[5]{7}$

22) $10^4 = 10{,}000$ 22) _____

A) $\log_4 10 = 10{,}000$ B) $\log_{10} 10{,}000 = 4$

C) $\log_4 10{,}000 = 10$ D) $\log_{10} 4 = 10{,}000$

Find the value of the logarithmic expression.

23) $\log_2 8$ 23) _____

A) 6 B) $\frac{1}{3}$ C) 1 D) 3

24) $\log_{10} \frac{1}{1000}$ 24) _____

A) 1000 B) –30 C) –3 D) 3

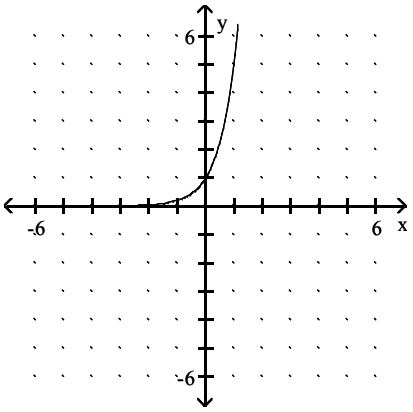
25) $\log_2 \frac{1}{8}$ 25) _____

A) –3 B) $\frac{1}{3}$ C) 3 D) $-\frac{1}{4}$

Graph the function.

26) $y = \log_5 x$ 26) _____

A)



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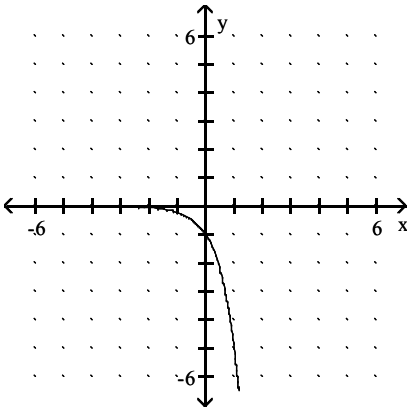
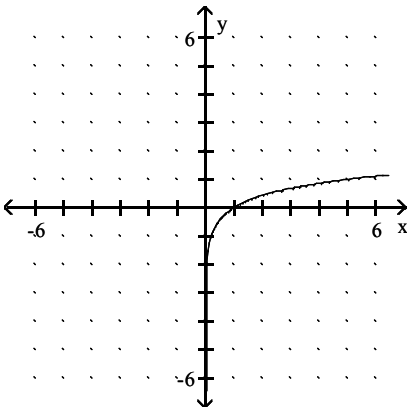


C)



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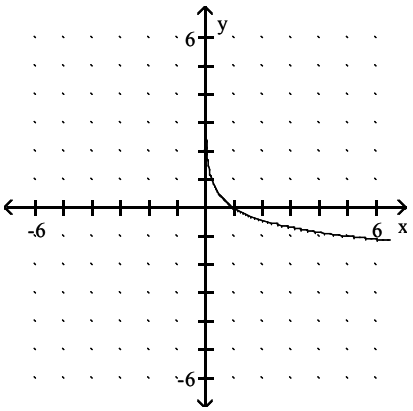
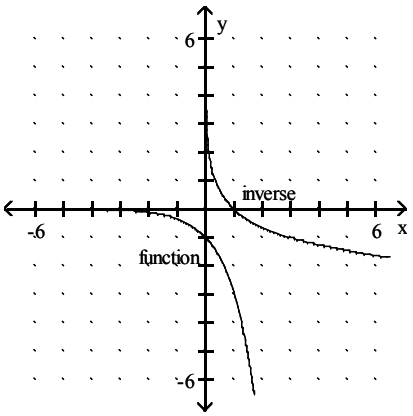


Graph the function and its inverse on the same set of axes.

27) $y = \log_3 x;\ y = 3^x$ 27) _____

A)



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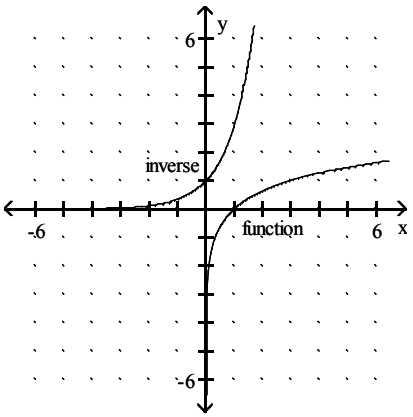

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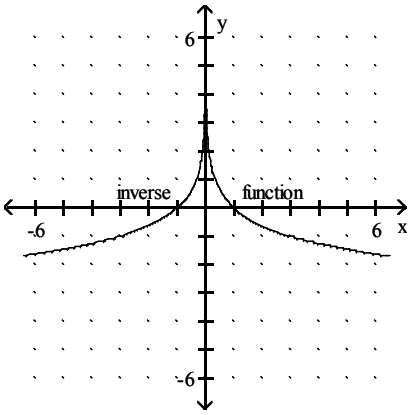

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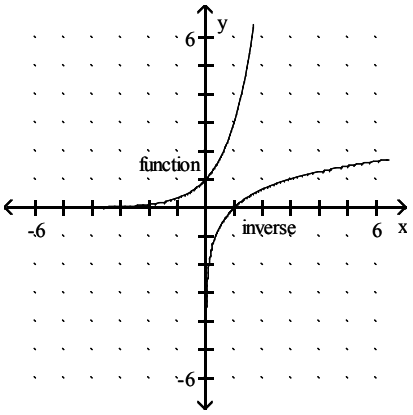

Solve for x.

28) $\log_2 1 = x$ 28) _____

A) 1 B) 0 C) 2 D) 4

Simplify.

29) $\log_5 5^{10}$ 29) _____

A) 15 B) 10 C) $\log_5 10$ D) 5

30) $5^{\log_5 13}$ 30) _____

A) 5 B) 18 C) 13 D) $\log_5 13$

31) $\log_6 6$ 31) _____

A) 1 B) $\frac{1}{6}$ C) 0 D) 6

Express as the logarithm of a single expression. Assume that variables represent positive numbers.

32) $\log_7 12 + \log_7 9$ 32) _____

A) $\log_7 21$ B) $\log_{14} 108$ C) $\log_{14} 21$ D) $\log_7 108$

33) $\log_5 3 + \log_5 x$ 33) _____

A) $\log_5 3^x$ B) $\log_5 3x$ C) $\log_5 (x + 3)$ D) $\log_{15} x$

34) $\log_7 3 + \log_7 (x^3 - 4) + \log_7 2$ 34) _____

A) $\log_7 (x^3 - 24)$ B) $\log_7 (3x^3 - 12)$

C) $\log_7 (6x^3 - 24)$ D) $\log_7 (x^3 + 1)$

35) $\log_2 7 - \log_2 9$ 35) _____

A) $\log_2 \frac{9}{7}$ B) $\log_4 \frac{7}{9}$ C) $\log_2 -2$ D) $\log_2 \frac{7}{9}$

36) $\log_7 12 - \log_7 x$ 36) _____

A) $\log_7 (12 - x)$ B) $\log_{14} \frac{12}{x}$ C) $\log_7 \frac{x}{12}$ D) $\log_7 \frac{12}{x}$

Use the power property to rewrite the expression.

37) $\log_5 x^3$ 37) _____

A) $3 \log_5 x^3$ B) $5 \log_3 x$ C) $5 \log x$ D) $3 \log_5 x$

38) $\log_5 3^{-2}$ 38) _____

A) $-10 \log 3$ B) $5 \log_2 3$ C) $3 \log_5 2$ D) $-2 \log_5 3$

39) $\log_8 \sqrt[5]{y}$ 39) _____

A) $\frac{1}{8} \log_5 y$ B) $\frac{1}{5} \log_8 \sqrt[5]{y}$ C) $5 \log_8 y$ D) $\frac{1}{5} \log_8 y$

Express as the logarithm of a single expression. Assume that variables represent positive numbers.

40) $\log_8 25 + \log_8 2 - \log_8 10$ 40) _____

A) $\log_8 5$ B) $\log_8 17$ C) $\log_8 \frac{50}{10}$ D) $\log_8 \frac{1}{5}$

Decide whether the statement is true or false.

41) $\log_5 25 + \log_5 125 = 5$ 41) _____

A) True B) False

Use a calculator to approximate the natural logarithm to four decimal places.

42) ln 35 42) _____

A) 3.5553 B) 0.2804 C) 1.5441 D) 12.9151

43) ln 0.998 43) _____

A) 0.0020 B) −0.0009 C) −0.0020 D) 0.0009

Approximate the logarithm to four decimal places using the change of base formula.

44) $\log_5 3$ 44) _____

A) –0.2218 B) 0.6826 C) 1.1761 D) 1.4650

Solve the equation.

45) $\log_3 x = 5$ 45) _____

A) 243 B) 15 C) 1.46 D) 125

46) $\log (2 + x) - \log (x - 4) = \log 3$ 46) _____

A) ∅ B) –7 C) $\frac{5}{2}$ D) 7

Solve for x.

47) $\log_5 25 = x$ 47) _____

A) 2 B) 5 C) 30 D) 125

48) $\log_2 \frac{1}{4} = x$ 48) _____

A) $\frac{1}{8}$ B) $\frac{1}{2}$ C) 2 D) –2

49) $\log_3 x = 2$ 49) _____

A) 6 B) 8 C) 5 D) 9

50) $\log_4 x = -3$ 50) _____

A) $\frac{1}{81}$ B) 1 C) –12 D) $\frac{1}{64}$