College Algebra

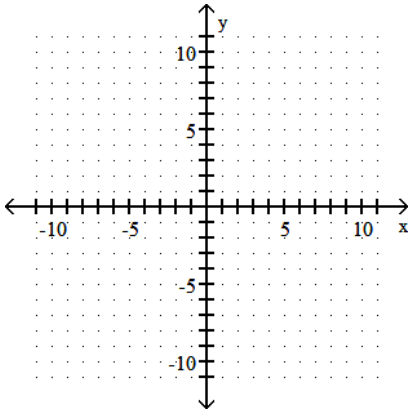
Exponential & Logarithmic Functions

Name_____

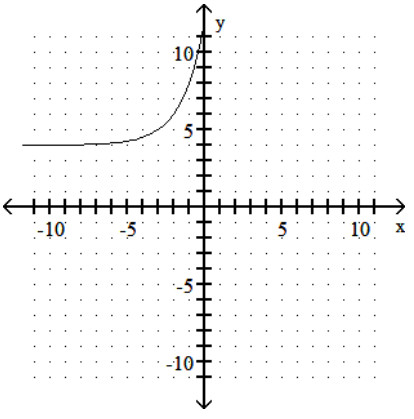
MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Use transformations to graph the function. Determine the domain, range, and horizontal asymptote of the function.

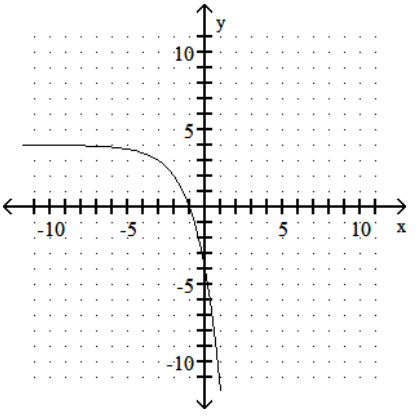
1) $f(x) = -2^{x+3} + 4$ 1) _____



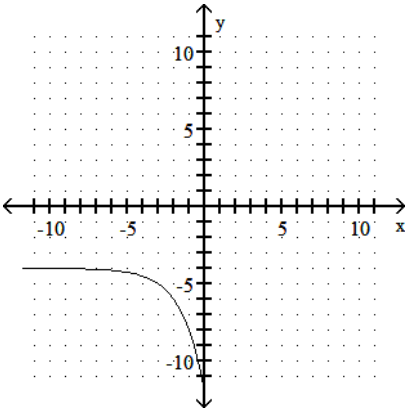
A) domain of f: $(-\infty, \infty)$; range of f: $(-4, \infty)$; horizontal asymptote: $y = 4$



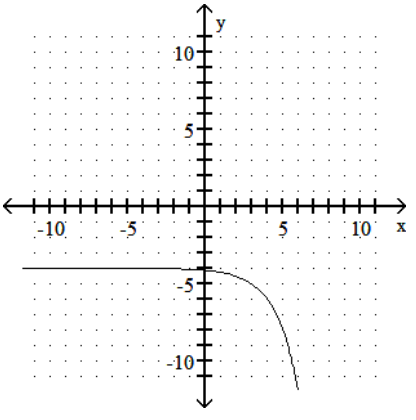
B) domain of f: $(-\infty, \infty)$; range of f: $(-\infty, 4)$; horizontal asymptote: $y = 4$



C) domain of f: $(-\infty, \infty)$; range of f: $(-\infty, -4)$; horizontal asymptote: $y = -4$

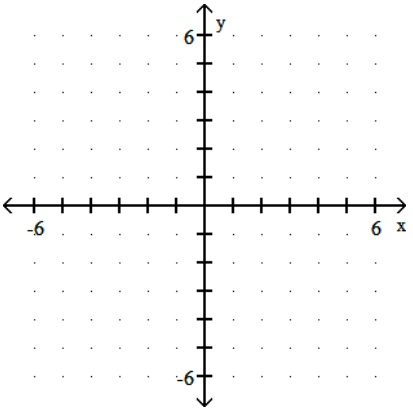


D) domain of f: $(-\infty, \infty)$; range of f: $(-\infty, -4)$; horizontal asymptote: $y = -4$

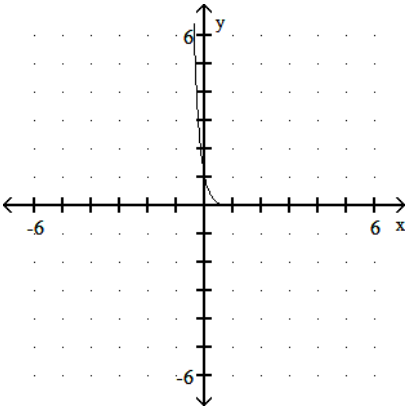


2) $f(x) = 5^{(x - 3)}$

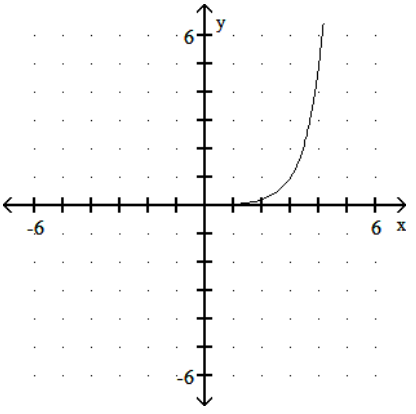
2) _____



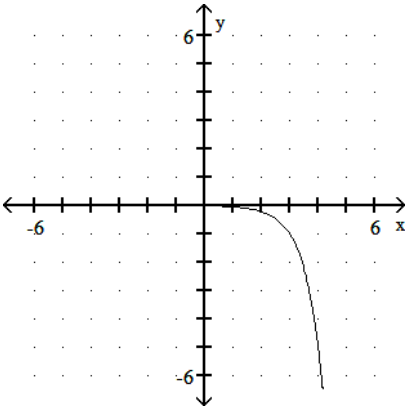
A) domain of f: $(-\infty, \infty)$; range of f:$(0, \infty)$
horizontal asymptote: y = 0



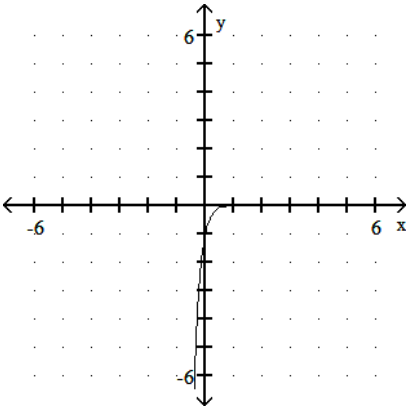
B) domain of f: $(-\infty, \infty)$; range of f:$(0, \infty)$
horizontal asymptote: y = 0



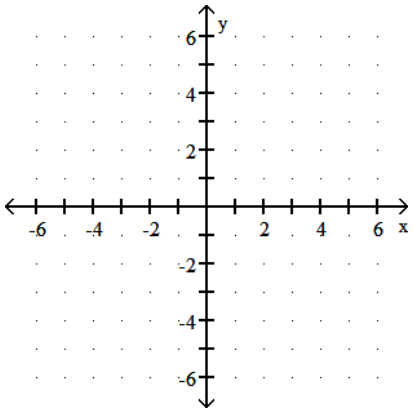
C) domain of f: $(-\infty, \infty)$; range of f:$(-\infty, 0)$
horizontal asymptote: y = 0



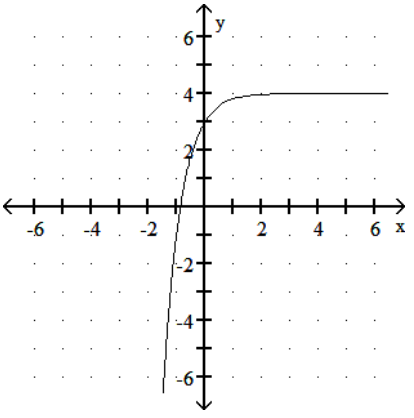
D) domain of f: $(-\infty, \infty)$; range of f:$(-\infty, 0)$
horizontal asymptote: y = 0



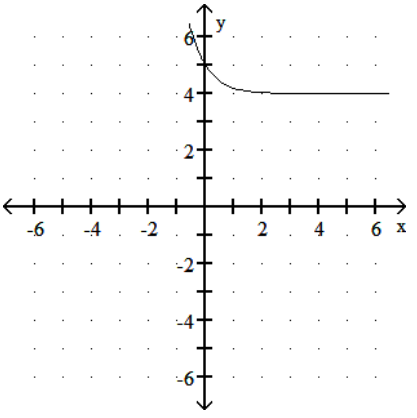
3) $f(x) = 4^{-x} + 5$ 3) _____



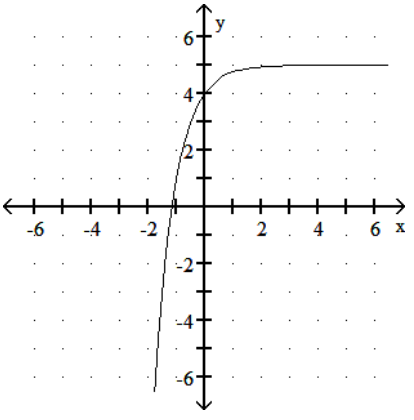
A) domain of f: $(-\infty, \infty)$; range of f:$(4, \infty)$
horizontal asymptote: y = 4



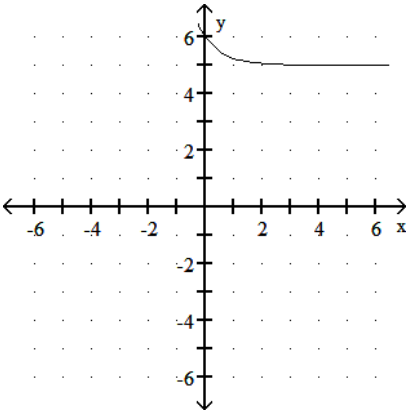
B) domain of f: $(-\infty, \infty)$; range of f:$(4, \infty)$
horizontal asymptote: y = 4



C) domain of f: $(-\infty, \infty)$; range of f:$(5, \infty)$
horizontal asymptote: y = 5

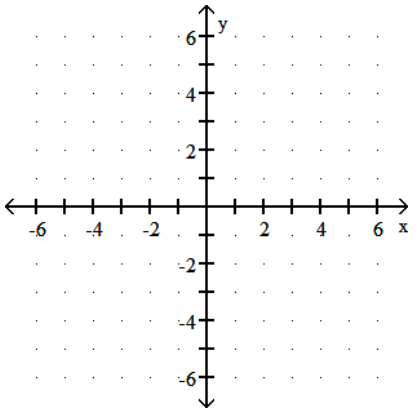


D) domain of f: $(-\infty, \infty)$; range of f:$(5, \infty)$
horizontal asymptote: y = 5

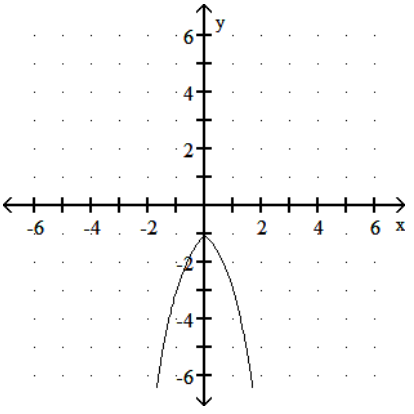


Graph the function.

4) $f(x) = 3|x|$ 4) _____



A)



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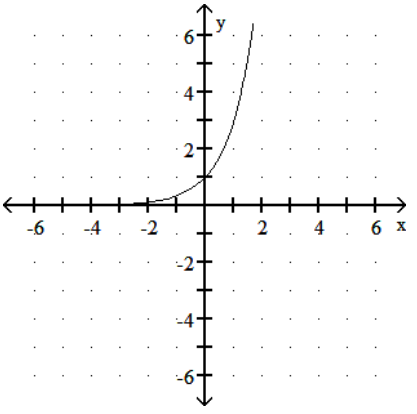
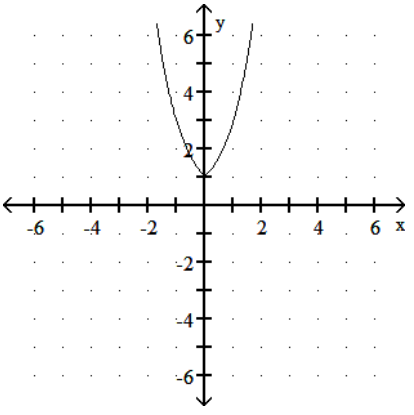
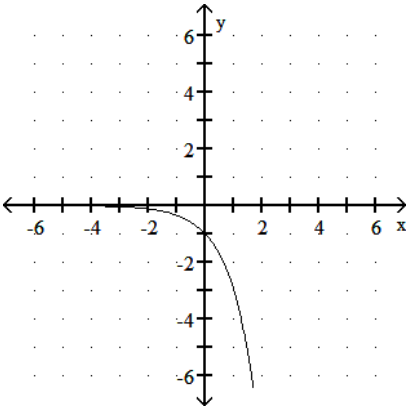


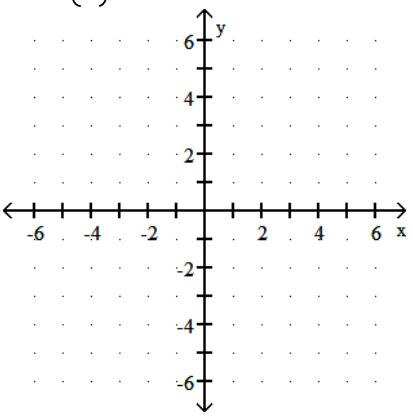
C)



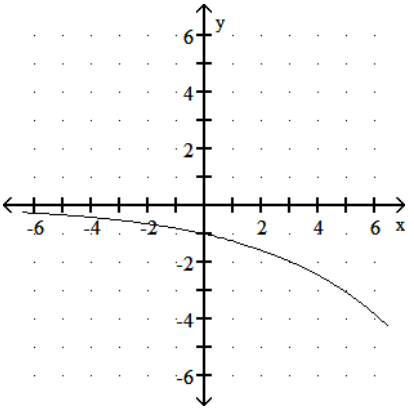
D)



5) $f(x) = \left(\frac{5}{4}\right)^x$ 5) _____



A)



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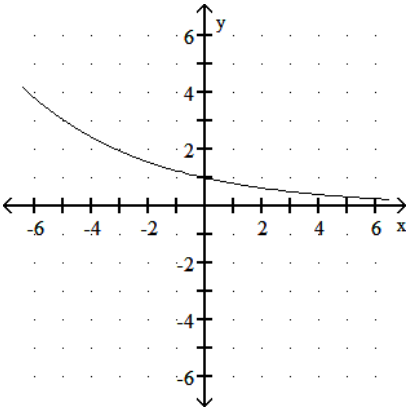

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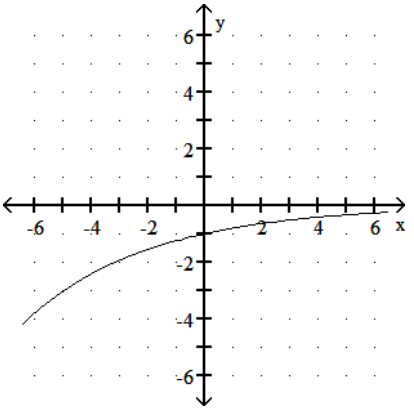

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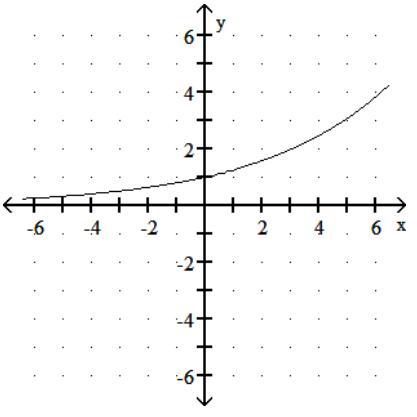


Solve the equation.

6) $2^{1 + 2x} = 32$ 6) _____

A) {4} B) {2} C) {16} D) {-2}

7) $18^x = 1$ 7) _____

A) {1} B) $\{\frac{1}{18}\}$ C) {0} D) ∅

8) $3^{-x} = \frac{1}{9}$ 8) _____

A) {2} B) $\left\{\frac{1}{2}\right\}$ C) $\left\{\frac{1}{3}\right\}$ D) {-2}

9) $2^{7 - 3x} = \frac{1}{4}$ 9) _____

A) {-3} B) {1} C) $\left\{\frac{1}{2}\right\}$ D) {3}

10) $2^{x} = \frac{1}{16}$ 10) _____

A) $\left\{\frac{1}{4}\right\}$ B) {-4} C) $\left\{\frac{1}{8}\right\}$ D) {4}

11) $2^{x} = 16$ 11) _____

A) {5} B) {4} C) {8} D) {3}

12) $4^{(3x - 7)} = 16$ 12) _____

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

13) $\left(\frac{1}{6}\right)^{x} = 216$ 13) _____

A) {-3} B) {3} C) $\left\{-\frac{1}{3}\right\}$ D) $\left\{\frac{1}{3}\right\}$

14) $2^{x^2 - 3} = 64$ 14) _____

A) {6} B) {3} C) $\{\sqrt{35}, -\sqrt{35}\}$ D) {3, -3}

15) $(e^{x})^{x} \cdot e^{45} = e^{14x}$ 15) _____

A) {-9, -5} B) {9} C) {9, 5} D) {5}

Change the exponential expression to an equivalent expression involving a logarithm.

16) $4^2 = x$ 16) _____

A) $\log_x 4 = 2$ B) $\log_4 2 = x$ C) $\log_2 x = 4$ D) $\log_4 x = 2$

17) $e^{x} = 9$ 17) _____

A) $\ln x = 9$ B) $\ln 9 = x$ C) $\log_x e = 9$ D) $\log_9 x = e$

Change the logarithmic expression to an equivalent expression involving an exponent.

18) $\log_4 x = 2$ 18) _____

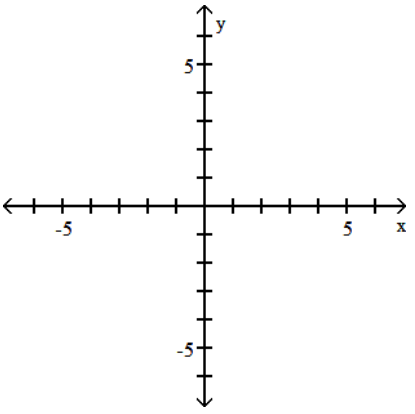
A) $4^2 = x$ B) $x^2 = 4$ C) $4^{x} = 2$ D) $2^4 = x$

19) $\log_2 16 = x$ 19) _____

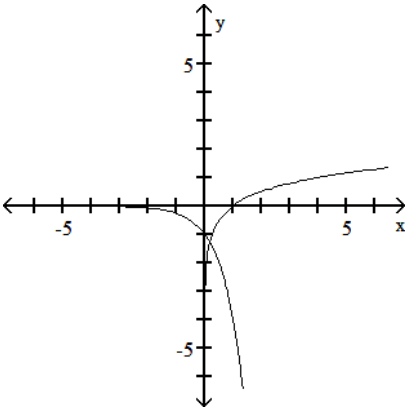
A) $16^x = 2$ B) $x^2 = 16$ C) $16^2 = x$ D) $2^x = 16$

Graph the function and its inverse on the same Cartesian plane.

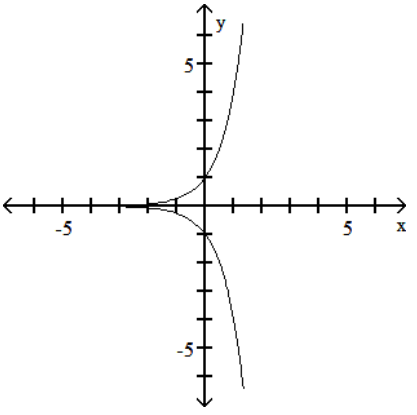
20) $f(x) = \log_4 x$ 20) _____



A)



B)



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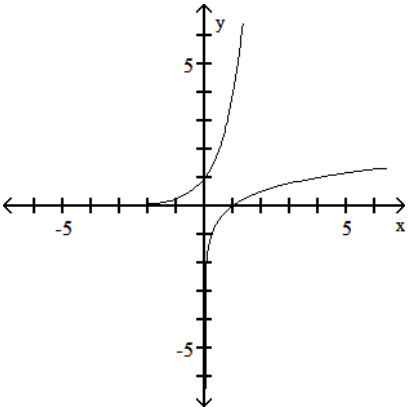
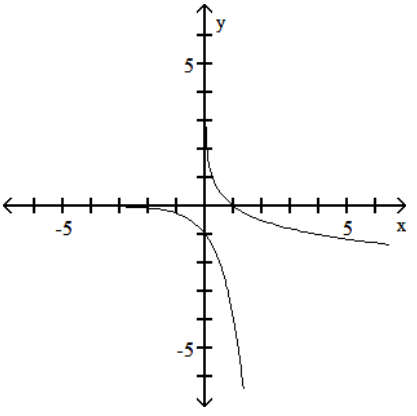
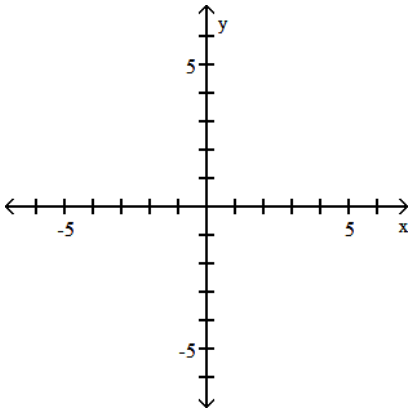


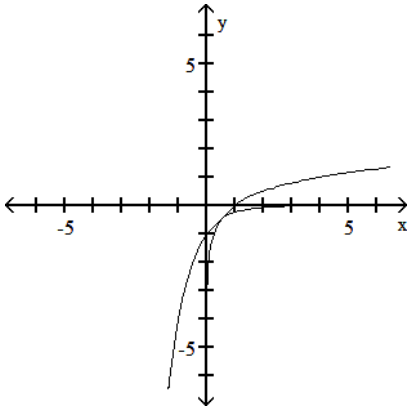
D)



21) $f(x) = \log_{1/4} x$ 21) _____



A)



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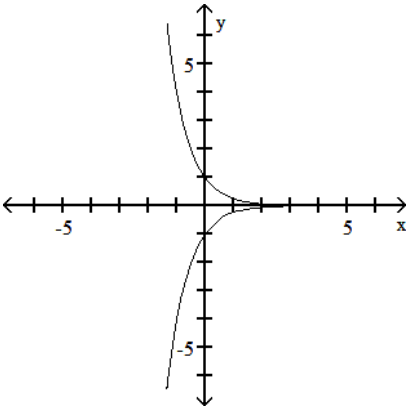

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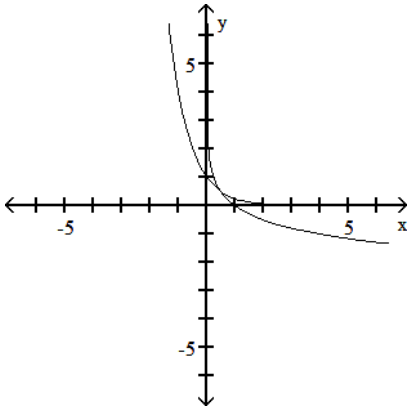
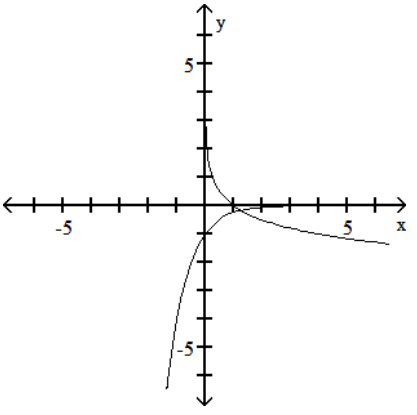
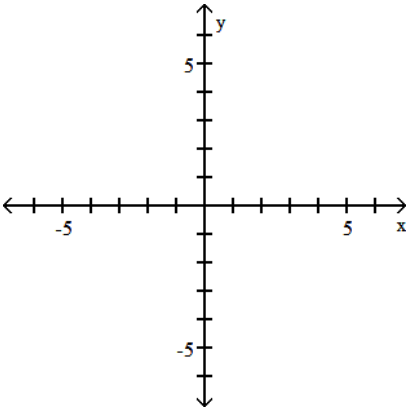


D)

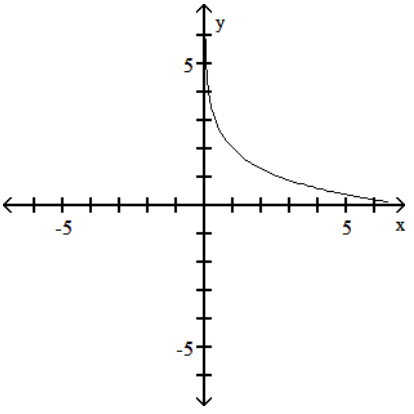


Graph the function.

22) $f(x) = 2 - \ln x$ 22) _____



A)



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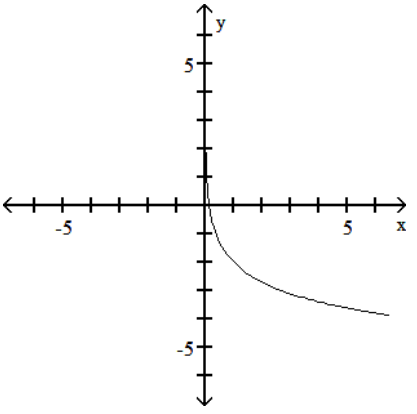

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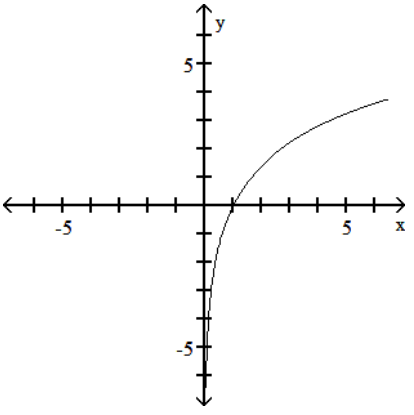
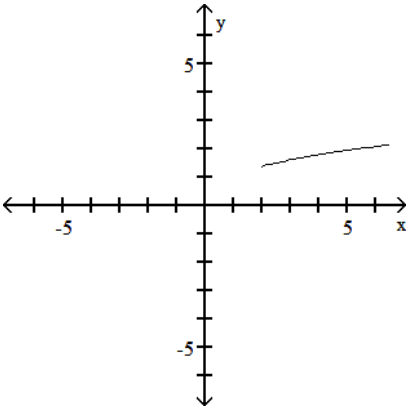
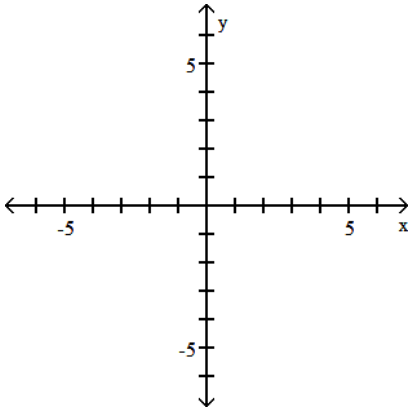


D)

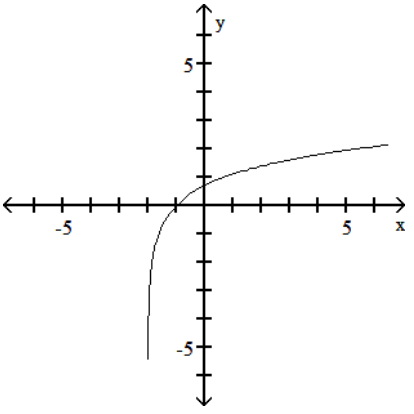


23) f(x) = 2 ln x

23) _____



A)



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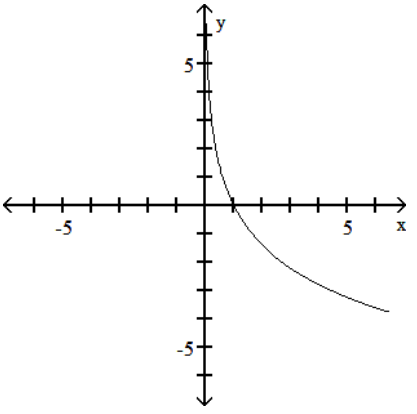

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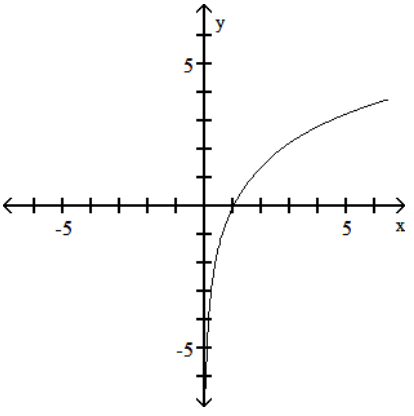

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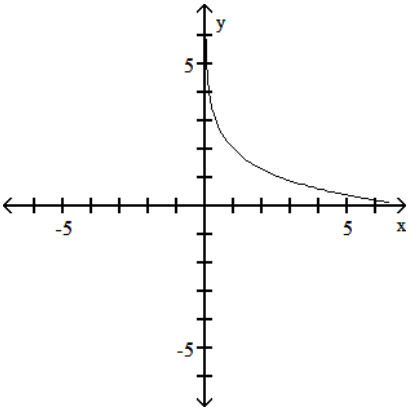
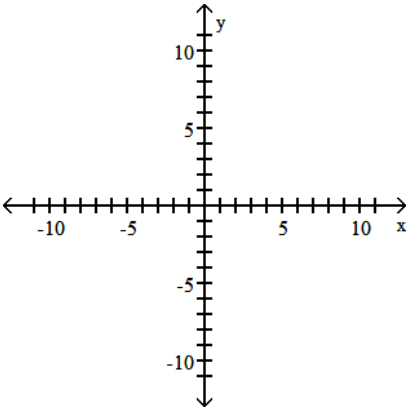
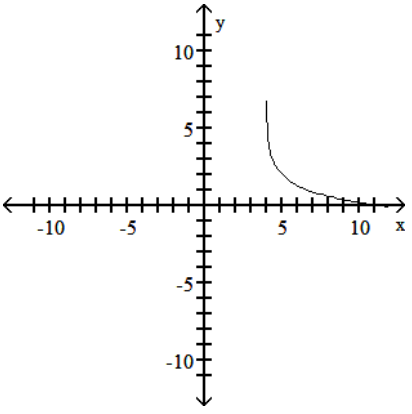


24) $f(x) = 2 - \ln(x + 4)$ 24) _____



A)



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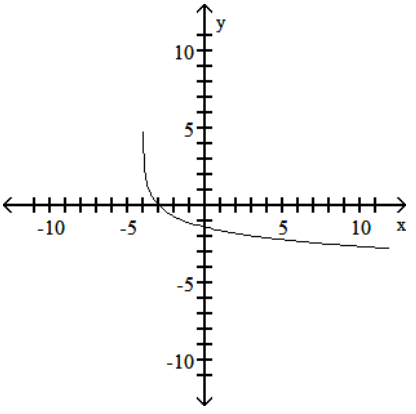

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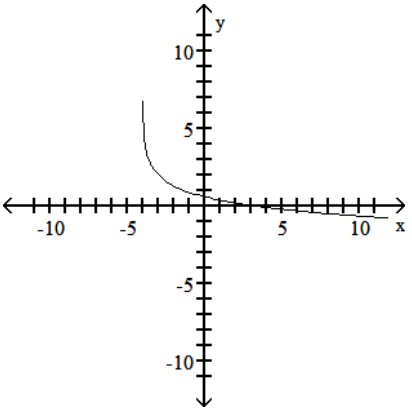
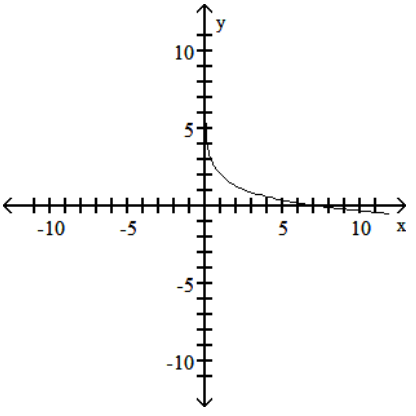


D)



Use the properties of logarithms to find the exact value of the expression. Do not use a calculator.

25) $\log_9 9^5$ 25) _____

A) 9 B) 1 C) 45 D) 5

26) $\ln e^{\sqrt{6}}$ 26) _____

A) $\sqrt{6}$ B) 36 C) 6 D) e

27) $\log_2 14 - \log_2 7$ 27) _____

A) 2 B) 1 C) 14 D) 7

28) $\log_4 24 - \log_4 6$ 28) _____

A) 6 B) 24 C) 4 D) 1

29) $\log_3 30 \cdot \log_{30} 9$ 29) _____

A) 3 B) 2 C) 9 D) 30

30) $10^{\log 30 - \log 6}$ 30) _____

A) log 24 B) 30 C) 5 D) 100,000

Suppose that ln 2 = a and ln 5 = b. Use properties of logarithms to write each logarithm in terms of a and b.

31) ln 10 31) _____

A) a - b B) ab C) ln a + ln b D) a + b

32) ln 20 32) _____

A) 2a + b B) 2a + 2b C) 4b D) a + b

Write as the sum and/or difference of logarithms. Express powers as factors.

33) $\log_{18} \frac{13\sqrt{r}}{s}$ 33) _____

A) $\log_{18} 13 + \frac{1}{2} \log_{18} r - \log_{18} s$ B) $\log_{18} s - \log_{18} 13 - \frac{1}{2} \log_{18} r$

C) $\log_{18} (13\sqrt{r}) - \log_{18} s$ D) $\log_{18} 13 \cdot \frac{1}{2} \log_{18} m \div \log_{18} s$

34) $\log_3 \frac{\sqrt[2]{5}}{q^2 p}$ 34) _____

A) $\log_3 5 - \log_3 q - \log_3 p$ B) $\frac{1}{2} \log_3 5 - 2 \log_3 q - \log_3 p$

C) $\frac{1}{2} \log_3 5 - 2 \log_3 q - 2 \log_3 p$ D) $2 \log_3 5 - 2 \log_3 q - \log_3 2$

Express as a single logarithm.

35) $(\log_a x - \log_a y) + 3 \log_a z$ 35) _____

A) $\log_a \frac{xz^3}{y}$ B) $\log_a xz^3y$ C) $\log_a \frac{3xz}{y}$ D) $\log_a \frac{x}{z^3y}$

36) $3 \log_6 x + 5 \log_6 (x - 6)$ 36) _____

A) $15 \log_6 x(x - 6)$ B) $\log_6 x(x - 6)^{15}$ C) $\log_6 x^3(x - 6)^5$ D) $\log_6 x(x - 6)$

Use the Change-of-Base Formula and a calculator to evaluate the logarithm. Round your answer to three decimal places.

37) $\log_2 0.638$ 37) _____

A) -0.648 B) -1.542 C) -0.195 D) 3.135

38) $\log_{4.5} 3.3$ 38) _____

A) 1.260 B) 0.794 C) 0.733 D) 0.519

Use the Change-of-Base Formula and a calculator to evaluate the logarithm. Round your answer to two decimal places.

39) $\log_{7.2} 299$ 39) _____

A) 41.53 B) 0.35 C) 2.89 D) 2.48

40) $\log_{5.3} 3.3$ 40) _____

A) 0.52 B) 0.62 C) 1.40 D) 0.72

Solve the equation.

41) $\log (3x) = \log 2 + \log (x - 1)$ 41) _____

A) $\left\{-\frac{2}{5}\right\}$ B) $\left\{\frac{1}{2}\right\}$ C) $\{2\}$ D) $\{-2\}$

42) $\log_2 (5x + 8) = \log_2 (5x + 3)$ 42) _____

A) {0} B) {5} C) $\left\{\frac{11}{5}\right\}$ D) $\varnothing$

43) $\log_4 (x + 4) + \log_4 (x - 2) = 2$ 43) _____

A) {4} B) {4, -6} C) {5} D) {-6}

44) $2^{(7 + 3x)} = \frac{1}{4}$ 44) _____

A) {-3} B) {3} C) $\left\{\frac{1}{2}\right\}$ D) {1}

45) $3 \cdot 5^{2t - 1} = 75$ 45) _____

A) $\left\{\frac{13}{10}\right\}$ B) {3} C) $\left\{\frac{1}{2}\right\}$ D) $\left\{\frac{3}{2}\right\}$

Solve the equation. Express irrational answers in exact form and as a decimal rounded to 3 decimal places.

46) $\left(\frac{3}{5}\right)^x = 2^{1 - x}$ 46) _____

A) $\ln\left(\frac{3}{5}\right) - \ln 2 \approx -1.204$ B) $\frac{\ln\left(\frac{3}{5}\right) + \ln 2}{\ln 2} \approx 0.263$

C) $\frac{\ln 2}{\ln\left(\frac{3}{5}\right) + \ln 2} \approx 3.802$ D) $\frac{\ln 6}{\ln 10} \approx 0.778$