Math 260 Chapter 4 & 9 Practice
Disclaimer: The actual exam is different. This is a study aid. Also, on tha actual exam you will be expected to show work correctly, neatly and logically to receive any credit.

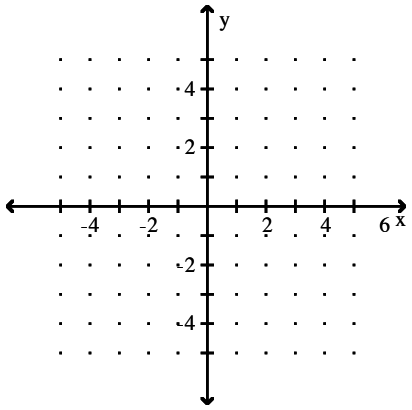
Find the function value. If the result is irrational, round your answer to the nearest thousandth.

1) Let $f(x) = 6^x$. Find $f(-3)$. 1) _____

2) Let $f(x) = \left(\frac{1}{6}\right)^x$. Find $f(-1)$. 2) _____

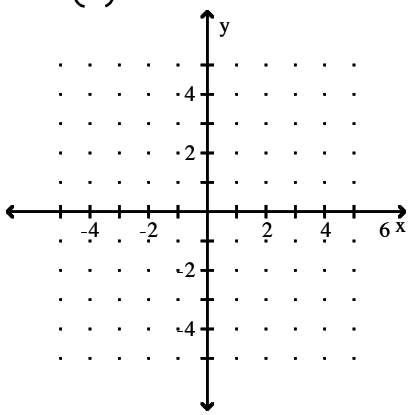
Graph the function. Label at least two points on the graph.

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

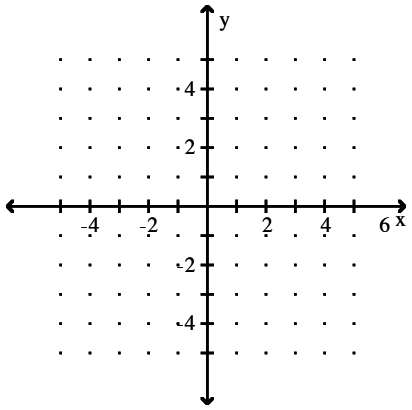


Graph the function.

4) $f(x) = \left(\frac{1}{2}\right)^x$ 4) _____

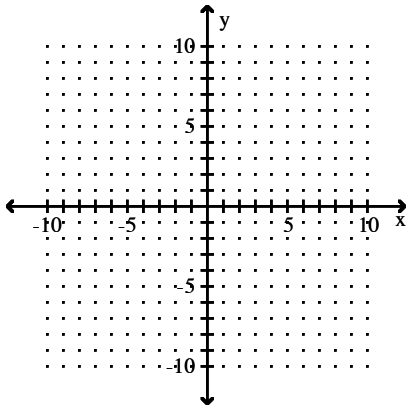


5) $f(x) = 2^{|x|}$ 5) _____

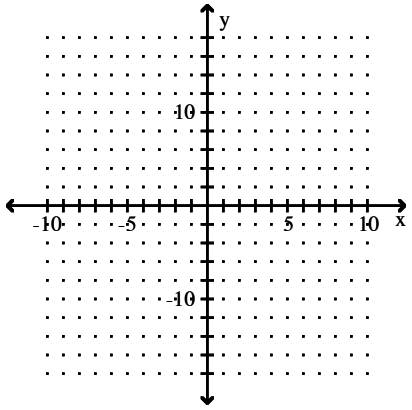


Graph the exponential function using transformations where appropriate.

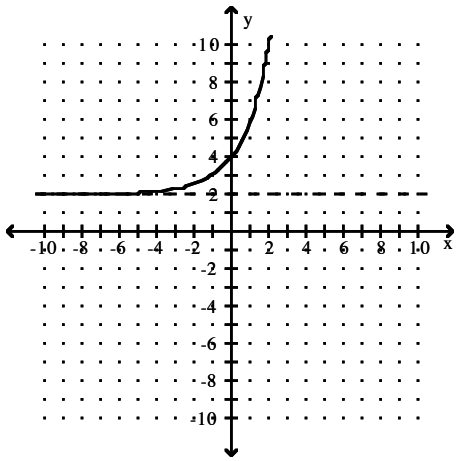
6) $f(x) = 4^{x+1}$ 6) _____



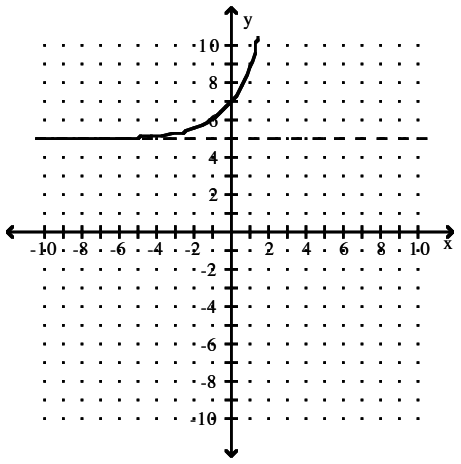
7) $f(x) = -3^{x-5}$ 7) _____



Write an equation for the graph given. The graph represents an exponential function f with base 2 or 3, translated and/or reflected.

8) 

8) _____

9) 

9) _____

Solve the equation.

10) $4^{(12\ -\ 4x)} = 256$ 10) _____

11) $4^{(8\ -\ 2x)} = 256$ 11) _____

12) $4 = b^{2/3}$ 12) _____

13) $\left(\frac{1}{3}\right)^{2x+3} = 9^{x-5}$ 13) _____

14) $(\sqrt{5}\,)^{x+1} = 25^{x}$ 14) _____

Provide an appropriate response.

15) Give an equation of the form $f(x) = a^x$ to define the exponential function whose graph contains the point (2, 16). Assume that $a > 0$. 15) _____

16) Use the properties of exponents to write the function of the form f(t) = kat, where k is a constant. 16) _____

$f(t) = 3^{3t+2}$

Find the future value.

17) $1972 invested for 12 years at 4% compounded quarterly 17) _____

18) $23,481 invested for 11 years at 5% compounded semiannually 18) _____

19) $1417.32 invested for 6 years at 4% compounded monthly 19) _____

Find the present value of the future value.

20) $11,000, invested for 4 years at 3% compounded monthly 20) _____

Solve the problem.

21) Find the required annual interest rate, to the nearest tenth of a percent, for $1100 to grow to $1400 if interest is compounded monthly for 7 years. 21) _____

22) The growth in the mouse population at a certain county dump can be modeled by the exponential function $A(t) = 906e^{0.012t}$, where t is the number of months since the population was first recorded. Estimate the population after 36 months. 22) _____

23) The decay of 938 mg of an isotope is given by $A(t) = 938e^{-0.022t}$, where t is time in years since the initial amount of 938 mg was present. Find the amount (to the nearest milligram) left after 96 years. 23) _____

Evaluate the logarithm.

24) $\log_{1/5} 5$ 24) _____

25) $\log_6 1$ 25) _____

26) $\log_8 (-1)$ 26) _____

Write in logarithmic form.

27) $3^2 = 9$ 27) _____

28) $\left(\frac{5}{6}\right)^3 = \frac{125}{216}$ 28) _____

29) $\left(\frac{5}{6}\right)^{-5} = \frac{7776}{3125}$ 29) _____

Write an equivalent expression in exponential form.

30) $\log_{10} 10{,}000{,}000 = 7$ 30) _____

31) $\log_{\sqrt{8}} 512 = 6$ 31) _____

Solve the equation.

32) $\log_6 \sqrt{6^6} = x$ 32) _____

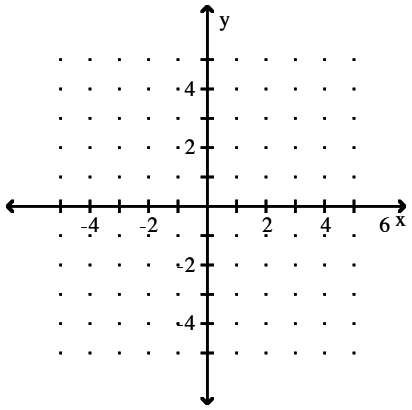
33) $\log_x 625 = 4$ 33) _____

34) $x = \log_{10} 0.01$ 34) _____

35) $8x - 32 = \log_x 1$ 35) _____

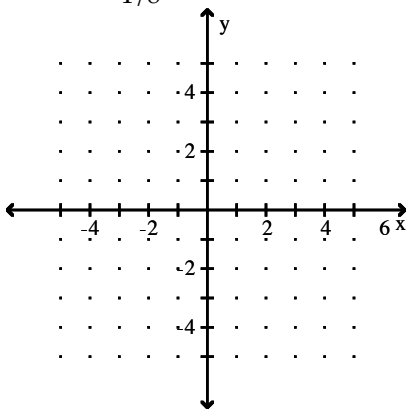
Graph the function. Give the domain and range. Label at least two points on the graph.

36) $f(x) = \log_2 x$ 36) _____

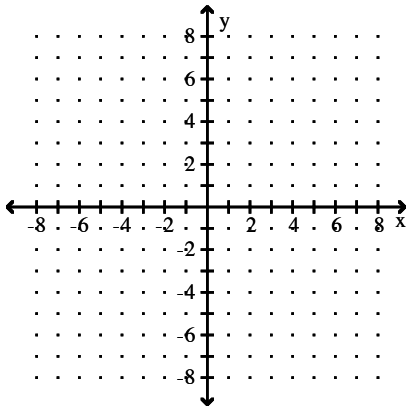


Graph the function. Give the domain and range.

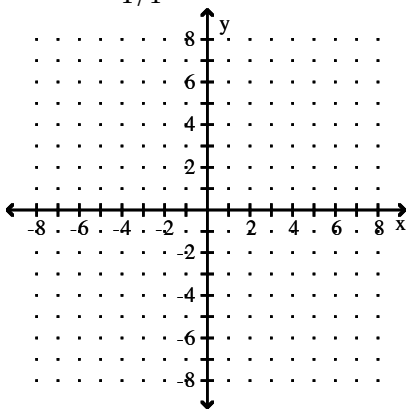
37) $f(x) = \log_{1/8} x$ 37) _____



38) $f(x) = \log_2 (x - 1)$ 38) _____



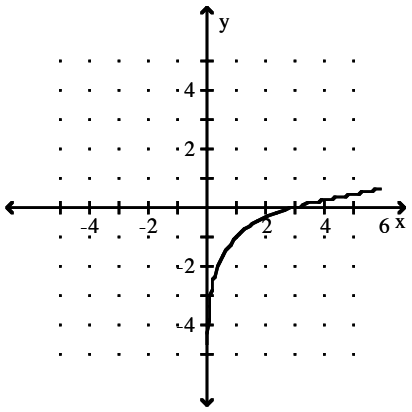
39) $f(x) = \log_{1/4} (x + 2)$ 39) _____



Match the function with its graph.

40) $f(x) = \log_3\left(\frac{x}{3}\right)$ 40) _____

A)



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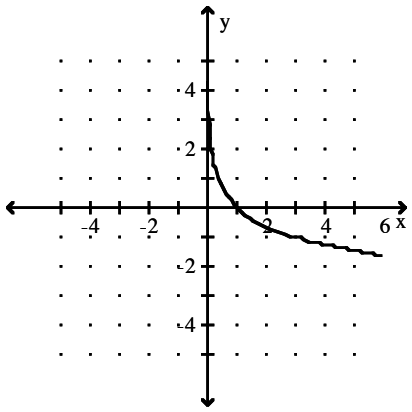
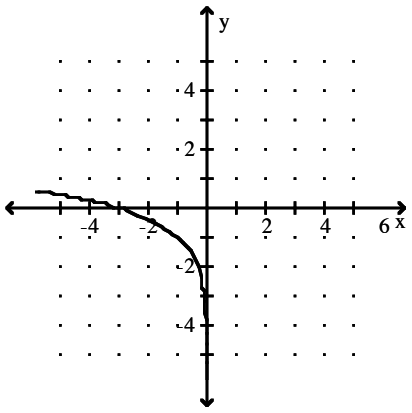
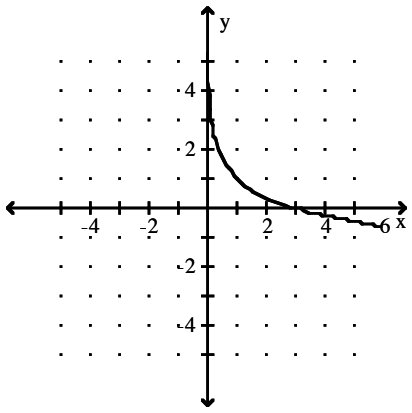


C)

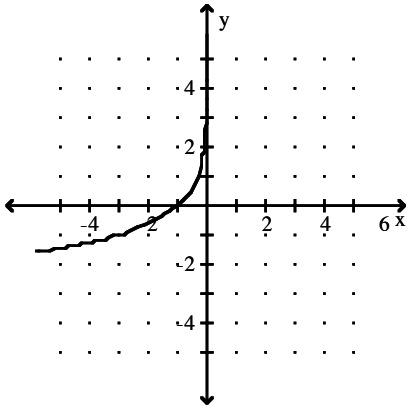


D)



41) $f(x) = \log_3(-x)$ 41) _____

A)



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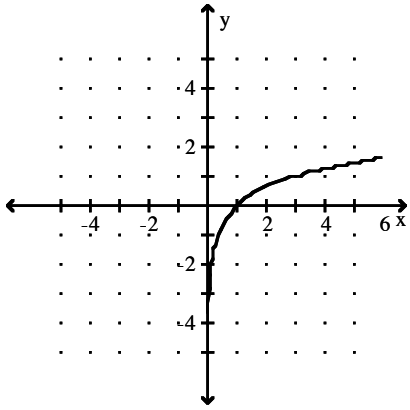

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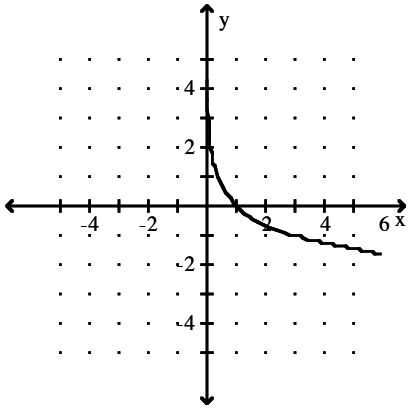
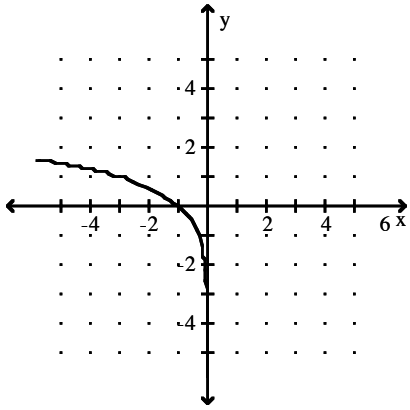
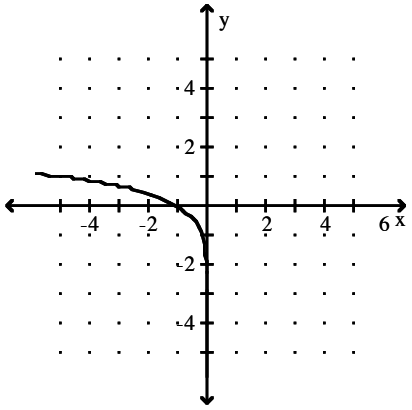


D)



42) $f(x) = \log_5(-x)$ 42) _____

A)



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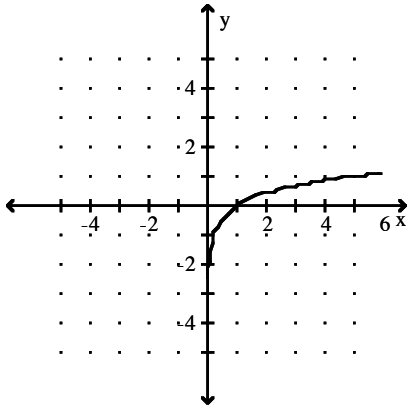

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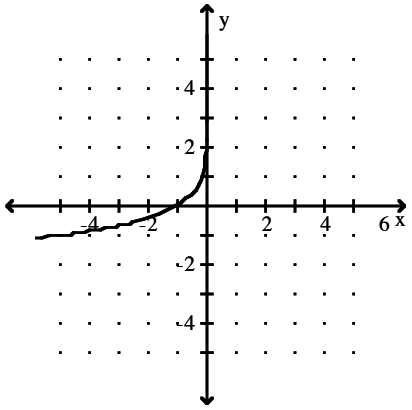
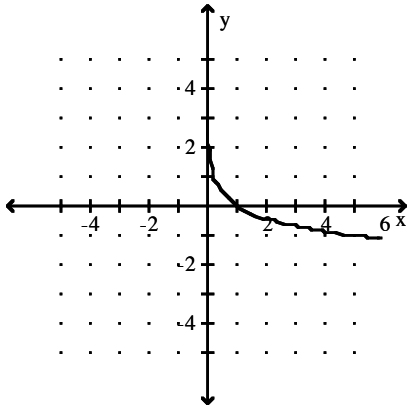
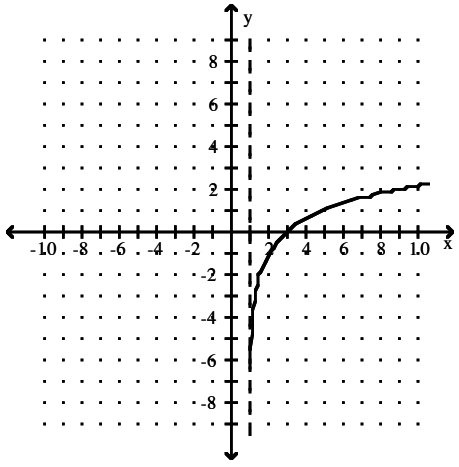


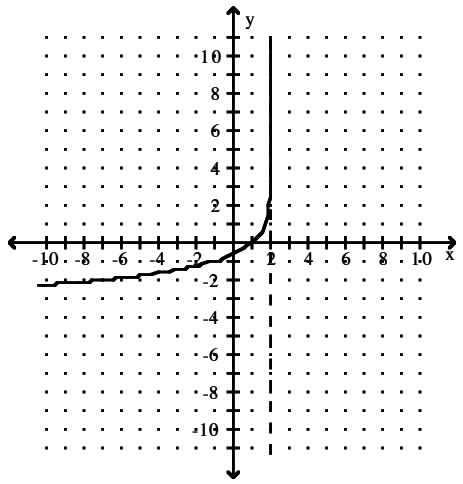
D)



Write an equation for the graph given. The graph represents an logarithmic function f with base 2 or 3, translated and/or reflected.

43) 43) _____



44) 

44) _____

Use the properties of logarithms to rewrite the expression. Simplify the result if possible. Assume all variables represent positive real numbers.

45) $\log_a(7x^5y)$ 45) _____

46) $\log_5(8x + 6y)$ 46) _____

47) $\log_2\left(\frac{5\sqrt{x}}{y}\right)$ 47) _____

48) $\log_b\left(\frac{m^9p^4}{n^3b^7}\right)$ 48) _____

49) $\log_b\sqrt{\frac{4x^9}{z^8}}$ 49) _____

Write the expression as a single logarithm with coefficient 1. Assume all variables represent positive real numbers.

50) $(\log_a t - \log_a s) + 4\log_a u$ 50) _____

51) $\frac{7}{9}\log_n 4y + \frac{7}{5}\log_n (16y^2)$ 51) _____

Given $\log_{10} 2 = 0.3010$ and $\log_{10} 3 = 0.4771$, find the logarithm without using a calculator.

52) $\log_{10} 6$ 52) _____

53) $\log_{10} 108$ 53) _____

54) $\log_{10} \frac{9}{8}$ 54) _____

Determine the function value.

55) Suppose $f(x) = \log_a x$ and $f(4) = 2$. Find $f\left(\frac{1}{16}\right)$. 55) _____

Use properties of logarithms to evaluate the expression.

56) $100^{\log_{10} 7}$ 56) _____

Solve the problem.

57) Let u = ln a and v = ln b. Write the following expression in terms of u and v without using the function ln. 57) _____

$\ln (b^7 \sqrt[4]{a})$

58) Let u = ln a and v = ln b. Write the following expression in terms of u and v without using the function ln. 58) _____

$\ln (\sqrt[4]{ab^2})$

Solve the problem. Round your answer to the nearest tenth, when appropriate. Use the formula $pH = -\log [H_3O^+]$, as needed.

59) Find the pH if $[H_3O^+] = 5.8 \times 10^{-10}$. 59) _____

Solve the problem.

60) The decibel level D of a sound is related to its intensity I by $D = 10 \log\left(\frac{I}{I_0}\right)$. If I_0 is 10^{-12}, then what is the intensity of a noise measured at 49 decibels? Express your answer in scientific notation, rounding to three significant digits, if necessary. 60) _____

Use the change of base rule to find the logarithm to four decimal places.

61) $\log_2 6$ 61) _____

Solve the equation. Round to the nearest thousandth.

62) $5^{(3x - 1)} = 17$ 62) _____

63) $4e^{(4x + 1)} = 12$ 63) _____

64) $e^{9x} e^{7x} = e^2$ 64) _____

Solve the equation and express the solution in exact form.

65) $\log (x - 3) = 1 - \log x$ 65) _____

66) $\log_9 (x - 4) + \log_9 (x - 4) = 1$ 66) _____

67) $\log 5x = \log 2 + \log (x + 2)$ 67) _____

68) $\log_2 \sqrt{2x2} = \frac{9}{2}$ 68) _____

69) $\log_3(\log_3 x) = 1$ 69) _____

70) $\log_5(x+8) + \log_5(x-8) = 2$ 70) _____

Solve the system by substitution.

71) $x - 7y = 4$ 71) _____
$x = 8y$

Solve the system by elimination.

72) $\frac{9x}{4} + \frac{y}{4} = -2$ 72) _____

$\frac{x}{4} + \frac{y}{4} = 0$

Solve the system.

73) $x - y + z = 2$ 73) _____
$x + y + z = -4$
$x + y - z = -8$

Use the given row transformation to change the matrix as indicated.

74) $\begin{bmatrix} -1 & 2 \\ 7 & 0 \end{bmatrix}$; 7 times row 1 added to row 2 74) _____

75) $\begin{bmatrix} 1 & 1 & 2 \\ -2 & 3 & -1 \\ 7 & 4 & 0 \end{bmatrix}$; 2 times row 1 added to row 2 75) _____

Write the augmented matrix for the system. Do not solve the system.

76) $3x + 5y = 17$ 76) _____
$6x + 6y = 30$

77) $4x + 2z = 50$ 77) _____
$9y - 2z = 63$
$2x + 2y - 2z = 16$

Use the Gauss–Jordan method to solve the system of equations. If the system has infinitely many solutions, give the solution with y arbitrary. Clearly annotate each step.

78) $2x + y = 8$ 78) _____
$-2x + 3y = -16$

Use the Gauss–Jordan method to solve the system of equations. If the system has infinitely many solutions, give the solution with y arbitrary. Annotate each step.

79) $2x - 7y = -5$
$-2x + 7y = 7$ 79) _____

80) $2x + 5y = -7$
$-6x - 15y = 21$ 80) _____

Use the Gauss–Jordan method to solve the system of equations. If the system has infinitely many solutions, let the last variable be the arbitrary variable. Clearly annotate each step.

81) $7x - 3y - z = 27$
$x + 7y - 4z = 25$
$8x + y + z = 79$ 81) _____

Use the Gauss–Jordan method to solve the system of equations. If the system has infinitely many solutions, let the last variable be the arbitrary variable. Annotate each step.

82) $6x - y + 4z = 25$
$9x + 8y - 9z = 108$
$7x - 4y + z = 0$ 82) _____

83) $x - z = -4$
$y + z = 3$
$x + z = 1$ 83) _____

Solve the problem using matrices.

84) John has a jarful of quarters and nickels. There are 88 coins in the jar. The value of the coins is $13.80. How many of each type of coin are there? 84) _____

85) Ellen wishes to mix candy worth $1.50 per pound with candy worth $6.42 per pound to form 24 pounds of a mixture worth $4.78 per pound. How many pounds of the more expensive candy should she use? 85) _____

Find the value of the determinant.

86) $\begin{vmatrix} 8 & -3 \\ 9 & -4 \end{vmatrix}$ 86) _____

87) $\begin{vmatrix} 0 & -5 \\ 10 & 0 \end{vmatrix}$ 87) _____

88) $\begin{vmatrix} 6 & 9 & 8 \\ 4 & 7 & 5 \\ 7 & 3 & 7 \end{vmatrix}$ 88) _____

89) $\begin{vmatrix} 5 & 7 & 6 \\ 7 & 6 & 3 \\ 6 & 5 & 5 \end{vmatrix}$ 89) _____

Solve the equation for x.

90) $\begin{vmatrix} 3 & x \\ x & 4 \end{vmatrix} = -4$ 90) _____

91) $\begin{vmatrix} -2 & 5 \\ 1 & x \end{vmatrix} = -3$ 91) _____

A triangle with vertices at (x_1, y_1), (x_2, y_2), and (x_3, y_3) has area equal to the absolute value of D, where

$$D = \frac{1}{2}\begin{vmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{vmatrix}.$$

Find the area of the triangle having vertices at P, Q, and R.

92) P(2, –3), Q(2, 4), R(3, 3) 92) _____

Use Cramer's rule to solve the system of equations. If D = 0, use another method to determine the solution set.

93) $x - 2y = 14$
$5x - 1y = 7$ 93) _____

94) $x + 7y = -35$
$8x + 8y = -40$ 94) _____

95) $x + y = 3$
$x + y = -4$ 95) _____

96) $x + y = 4$
$3x + 3y = 12$ 96) _____

Find the partial fraction decomposition for the rational expression.

97) $\dfrac{9x - 42}{x^2 - 9x + 20}$ 97) _____

98) $\dfrac{4x^2 - 3x + 2}{(x^2 - 4)(x - 1)}$ 98) _____

99) $\dfrac{3x - 31}{(x - 8)^2}$ 99) _____

100) $\dfrac{-4x^2 - 3x + 22}{(x + 4)^2(3x + 2)}$ 100) _____

101) $\dfrac{4x^3 + 8x^2 + 5x - 7}{2x^2 - x - 1}$ 101) _____

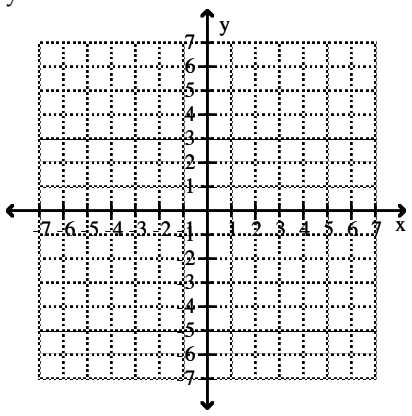
102) $\frac{-5x^2 - 2x - 61}{(x - 3)(x^2 + 5)}$ 102) _____

103) $\frac{546x^2 + 156x}{(x^2 + 3)(x + 6)}$ 103) _____

Graph the solution set of the system of inequalities.

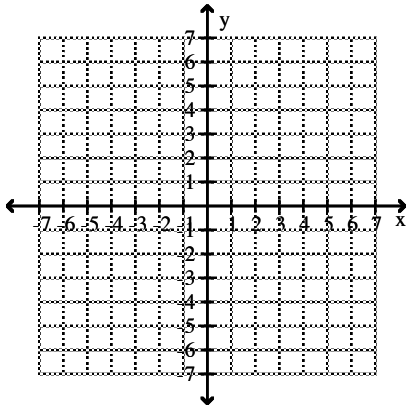
104) $y \leq -x^2 - 6x - 4$ 104) _____

$y \geq x^2 + 6x + 4$



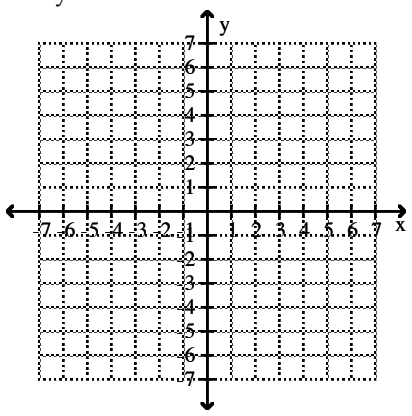
105) $\frac{x^2}{9} + \frac{y^2}{25} \leq 1$ 105) _____

$\frac{x^2}{25} + \frac{y^2}{9} \geq 1$



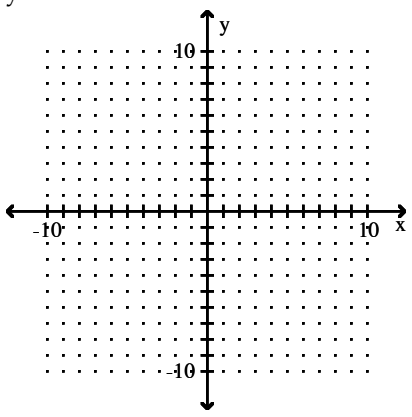
106) $\frac{x^2}{9} - \frac{y^2}{16} \geq 1$ 106) _____

$x^2 + y^2 \leq 36$



107) $y \geq \left(\frac{1}{3}\right)^x$ 107) _____

$y \leq 8$



Decide whether or not the matrices are inverses of each other.

108) $\begin{bmatrix} 10 & 1 \\ -1 & 0 \end{bmatrix}$ and $\begin{bmatrix} 0 & 1 \\ -1 & 10 \end{bmatrix}$ 108) _____

109) $\begin{bmatrix} -5 & 1 \\ -7 & 1 \end{bmatrix}$ and $\begin{bmatrix} \frac{1}{2} & -\frac{1}{2} \\ \frac{7}{2} & -\frac{5}{2} \end{bmatrix}$ 109) _____

Find the inverse, if it exists, for the matrix. Steps must be shown.

110) $\begin{bmatrix} 3 & 3 \\ -4 & 4 \end{bmatrix}$ 110) _____

Find the inverse, if it exists, for the matrix.

111) $\begin{bmatrix} -1 & 0 \\ 3 & 5 \end{bmatrix}$ 111) _____

112) $\begin{bmatrix} 2 & 1 \\ -6 & -3 \end{bmatrix}$ 112) _____

Solve the system by using the inverse of the coefficient matrix.

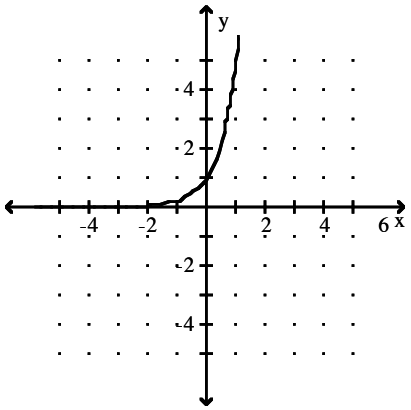
113) $-5x + 3y = 8$
$-2x + 4y = 20$ 113) _____

114) $3x + 5y = -10$
$-3x - 6y = 9$ 114) _____

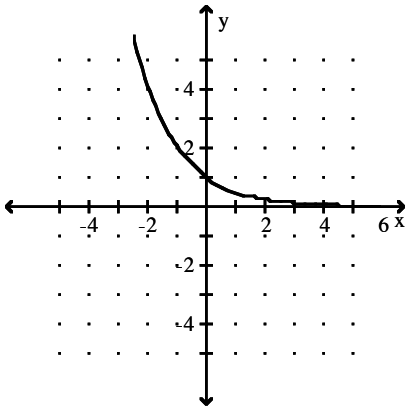
1) $\frac{1}{216}$

2) 6

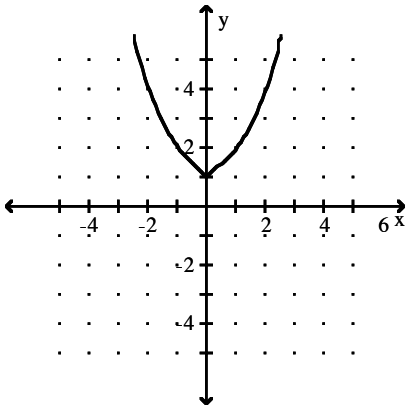
3)



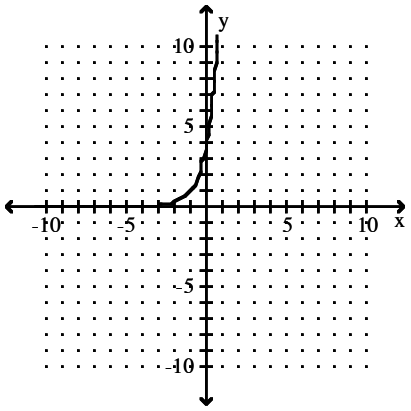
4)



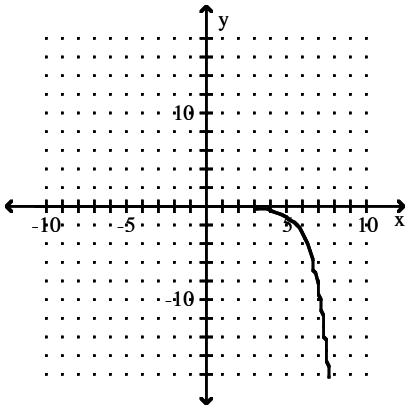
5)



6)



7)



8) $2^{x+1}+2$

9) $2^{x+1}+5$

10) {2}

11) {2}

12) {–8, 8}

13) $\left\{\frac{7}{4}\right\}$

14) $\left\{\frac{1}{3}\right\}$

15) $f(x) = 4x$

16) $f(t) = 9 \cdot 27t$

17) $3179.31

18) $40,424.22

19) $1801.05

20) $9757.59

21) 3.5%

22) 1396

23) 113

24) –1

25) 0

26) Undefined

27) $\log_3 9 = 2$

28) $\log_{5/6}\left(\frac{125}{216}\right) = 3$

29) $\log_{5/6}\left(\frac{7776}{3125}\right) = -5$

30) $10^7 = 10{,}000{,}000$

31) $8^3 = 512$

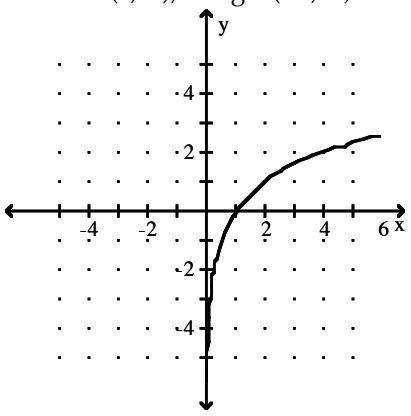
32) {3}

33) {5}

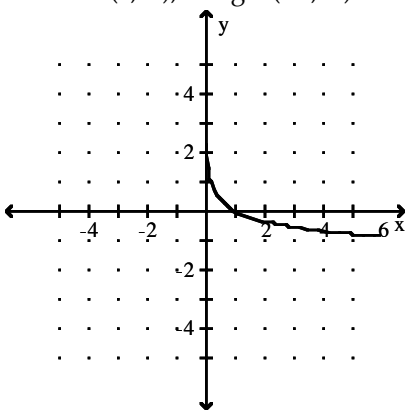
34) {–2}

35) {4}

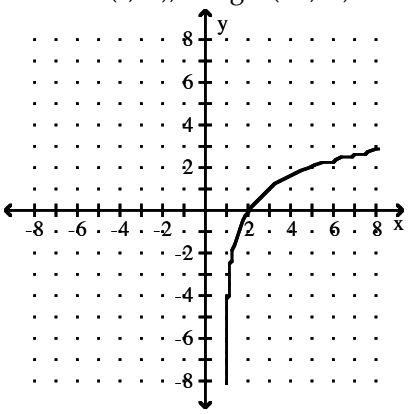
36) domain: (0, ∞); range: (–∞, ∞)



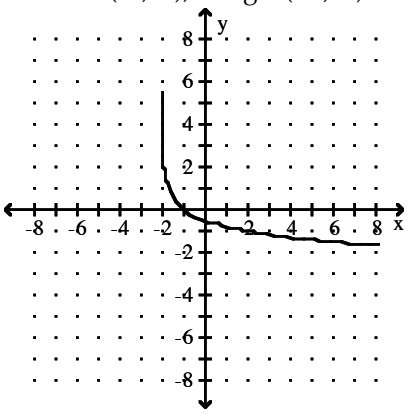
37) domain: (0, ∞); range: (–∞, ∞)



38) domain: (1, ∞); range: (–∞, ∞)



39) domain: (–2, ∞); range: (–∞, ∞)



40) A

41) D

42) A

43) $\log_2(x-1)-1$

44) $-\log_3(-x+2)$

45) $\log_a 7+5\log_a x+\log_a y$

46) $\log_5(8x+6y)$

47) $\log_2 5+\frac{1}{2}\log_2 x-\log_2 y$

48) $9\log_b m+4\log_b p-3\log_b n-7$

49) $\log_b 2+\frac{9}{2}\log_b x-4\log_b z$

50) $\log_a\left(\frac{tu^4}{s}\right)$

51) $\log_n(4^{161/45}y^{161/45})$

52) 0.7781

53) 2.0333

54) 0.0512

55) –4

56) 49

57) $7v + \frac{u}{4}$

58) $\frac{u}{4} + \frac{1}{2}v$

59) 9.2

60) 7.94×10^{-8} watt/m^2

61) 2.5850

62) {0.920}

63) {0.025}

64) {0.125}

65) {5}

66) {7}

67) {1.33333333}

68) {– 16, 16}

69) {27}

70) $\{\sqrt{89}\}$

71) {(32, 4)}

72) $\{(-1, 1)\}$

73) {(–3, –3, 2)}

74)
$$\begin{bmatrix} -1 & 2 \\ 0 & 14 \end{bmatrix}$$

75)
$$\begin{bmatrix} 1 & 1 & 2 \\ 0 & 5 & 3 \\ 7 & 4 & 0 \end{bmatrix}$$

76)
$$\left[\begin{array}{cc|c} 3 & 5 & 17 \\ 6 & 6 & 30 \end{array}\right]$$

77)
$$\left[\begin{array}{ccc|c} 4 & 0 & 2 & 50 \\ 0 & 9 & -2 & 63 \\ 2 & 2 & -2 & 16 \end{array}\right]$$

78) {(5, –2)}

79) $\emptyset$

80) $\left\{\left(-\frac{5}{2}y - \frac{7}{2}, y\right)\right\}$

81) {(8, 7, 8)}

82) {(5, 9, 1)}

83) $\left\{\left(-\frac{3}{2}, \frac{1}{2}, \frac{5}{2}\right)\right\}$

84) 47 quarters; 41 nickels

85) 16 lb

86) –5

87) 50

88) –29

89) –50

90) {–4, 4}

91) {–1}

92) $\frac{7}{2}$

93) {(0, –7)}

94) {(0, –5)}

95) Cramer's rule does not apply since D = 0; ∅

96) Cramer's rule does not apply since D = 0; {(4 – y, y)}

97) $\frac{3}{x-5}+\frac{6}{x-4}$

98) $\frac{3}{x-2}+\frac{2}{x+2}+\frac{-1}{x-1}$

99) $\frac{3}{x-8}+\frac{-7}{(x-8)2}$

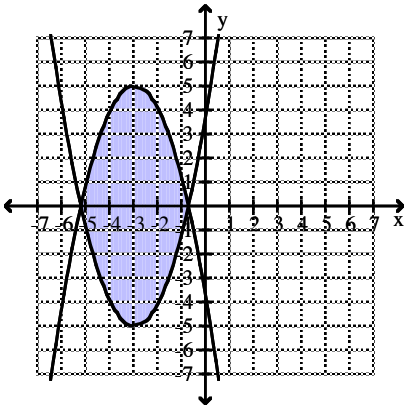
100) $\frac{2}{3x+2}+\frac{-2}{x+4}+\frac{3}{(x+4)2}$

101) $2x+5+\frac{16}{6x+3}+\frac{10}{3x-3}$

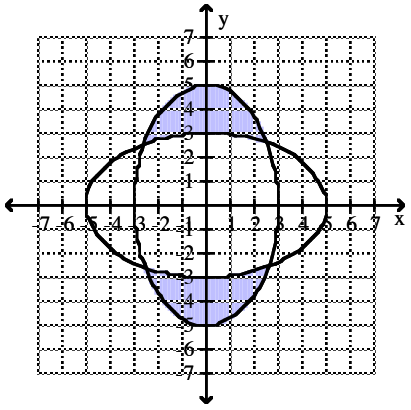
102) $\frac{3x+7}{x2+5}+\frac{-8}{x-3}$

103) $\frac{66x-240}{x2+3}+\frac{480}{x+6}$

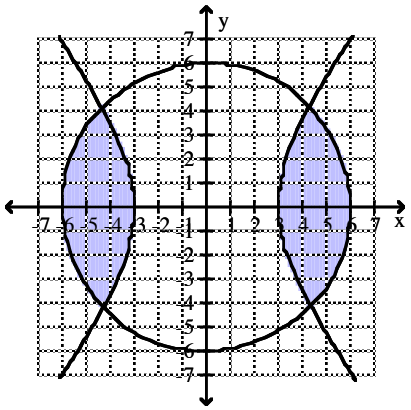
104)



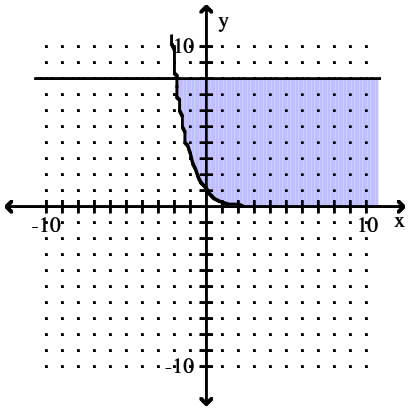
105)



106)



107)



108) No

109) Yes

110)

$$\begin{bmatrix} \frac{1}{6} & -\frac{1}{8} \\ \frac{1}{6} & \frac{1}{8} \end{bmatrix}$$

111) $\begin{bmatrix} -1 & 0 \\ \frac{3}{5} & \frac{1}{5} \end{bmatrix}$

112) The inverse does not exist.

113) {(2, 6)}

114) {(–5, 1)}