Name_____

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

Use the order of operations to simplify the expression.

1) $\dfrac{8 \cdot (5 - 4) + 8 \cdot 4}{8 \cdot (3 - 1)}$

1) _____

    A) $\dfrac{5}{2}$ B) 2   C) 65   D) $\dfrac{7}{2}$

2) $\dfrac{-4(4) - (3)3^3}{-1 - \sqrt{121} + 6}$

2) _____

    A) $\dfrac{171}{2}$ B) $\dfrac{97}{6}$ C) 18   D) $\dfrac{745}{6}$

3) $\dfrac{5(2 + 1) - 7(1 + 1)}{5(4 - 2) - 2^3}$

3) _____

    A) $\dfrac{1}{6}$ B) $\dfrac{1}{2}$ C) $\dfrac{1}{8}$ D) 4

Solve the equation.

4) $\dfrac{2x}{5} - \dfrac{x}{3} = 4$

4) _____

    A) {−120}   B) {60}   C) {120}   D) {−60}

Solve the problem.

5) Find the simple interest if $3300 is invested at 6.9% for 4 years.

5) _____

    A) $56.92   B) $227.70   C) $1913.04   D) $910.80

6) A chemical solution contains 7% salt. How much salt is in 2 ml of solution? Round your answer to three decimal places, if necessary.

6) _____

    A) 1.4 ml   B) 28.571 ml   C) 2.857 ml   D) 0.14 ml

7) The speed of a stream is 6 mph. If a boat travels 92 miles downstream in the same time that it takes to travel 46 miles upstream, what is the speed of the boat in still water?

7) _____

    A) 21 mph   B) 12 mph   C) 18 mph   D) 20 mph

8) The two largest oil spills together released 359 million gallons of oil into the oceans. The smaller of the two released 27 million gallons less than the larger of the two. How many million gallons of oil did the larger one release?

8) _____

    A) 193 million gallons   B) 166 million gallons

    C) 110 million gallons   D) 332 million gallons
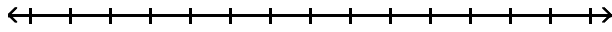
Solve the equation.

9) $|b + 9| = 5$

9) _____

    A) $\varnothing$ B) {−4, −14}   C) {4, 14}   D) {−4}

10) $|9 - 3p| = 6$
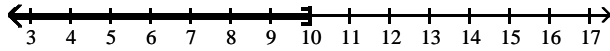
10) _____

    A) {1, 5}   B) {5}   C) {−5, 1}

Solve the inequality. Give the solution set in both interval and graph forms.
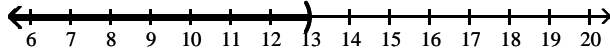
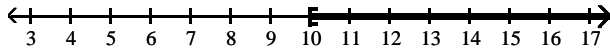11) $13y + 6 \leq 12y + 16$

A) $\{-5, -1\}$

B) $(-\infty, 10]$
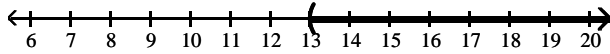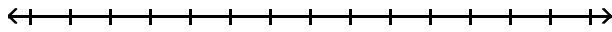
C) $(-\infty, 13)$

D) $[10, \infty)$

E) $(13, \infty)$
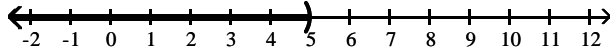
12) $-3z - 2 > -4z + 3$
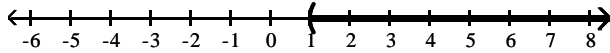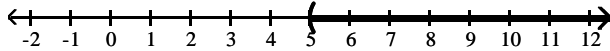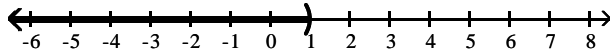
A) $(-\infty, 5)$

B) $(1, \infty)$

C) $(5, \infty)$

D) $(-\infty, 1)$

Find an equation of the line that satisfies the conditions. Write the equation in standard form.

13) Through (2, 3); $m = -\dfrac{3}{8}$

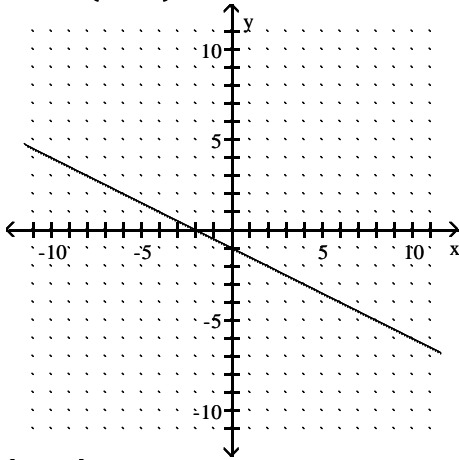A) $8x + 3y = -30$ B) $3x - 8y = 30$ C) $3x + 8y = -30$ D) $3x + 8y = 30$

Find the x– and y–intercepts. Then graph the equation.
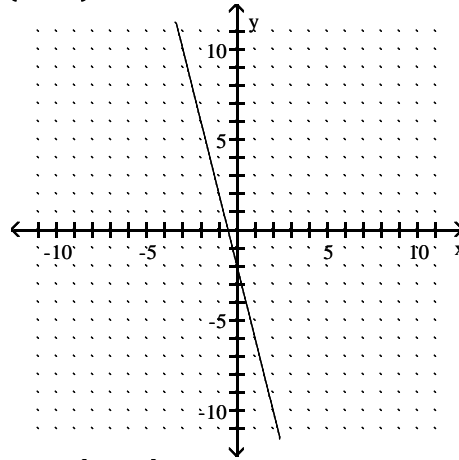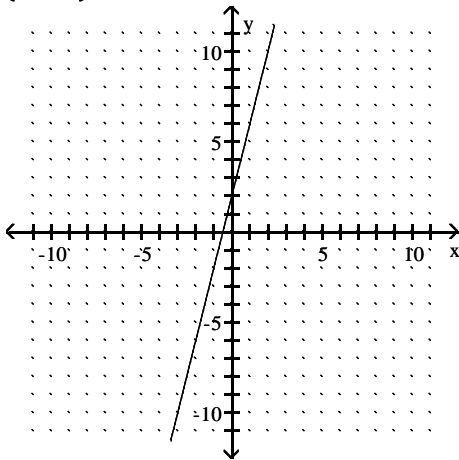
14) $8y - 2x = -4$

14) _____

A) $(-2, 0); \left(0, -\dfrac{1}{2}\right)$

B) $\left(-\dfrac{1}{2}, 0\right); (0, -2)$

C) $\left(-\dfrac{1}{2}, 0\right); (0, 2)$

D) $(2, 0); \left(0, -\dfrac{1}{2}\right)$

Find an equation of the line passing through the two points. Write the equation in standard form.

15) $(-2, 2)$ and $(1, 10)$

15) _____

    A) $-8x - 3y = -22$ B) $4x + 9y = -86$ C) $8x - 3y = -22$ D) $-4x - 9y = -86$

Evaluate the problem.

16) Find $f(-4)$ when $f(x) = 5x^2 + 2x + 5$.

16) _____

    A) 13   B) 77   C) 67   D) 93

Evaluate the product.

17) If $f(x) = 4x + 5$ and $g(x) = 2x^2 - 6x + 4$, find $(fg)(-2)$.

17) _____

    A) 40   B) 101   C) –72   D) –92

Find the slope of the line and sketch the graph.

18) $4x + 5y = 22$

18) _____

A) Slope: $-\dfrac{4}{5}$

B) Slope: $\dfrac{4}{5}$

C) Slope: $\dfrac{5}{4}$
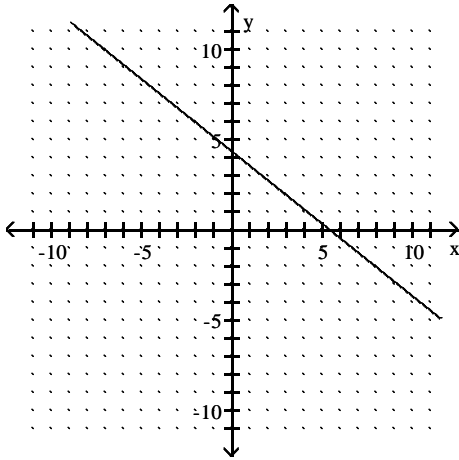
D) Slope: $-\dfrac{5}{4}$

Evaluate the composition of functions.

19) Let $f(x) = x^2 + 3$ and $g(x) = 4x + 6$. Find $(g \circ f)(5)$.

19) _____

   A) 34   B) 118   C) 679   D) 106

Solve the system by substitution.

20) $5x - 2y = -1$
    $x + 4y = 35$

20) _____

   A) {(3, 9)}   B) {(3, 8)}   C) {(2, 8)}   D) {(2, 9)}

Solve the system by elimination.

21) $x + 4y = 13$
    $2x + 3y = 6$

21) _____

   A) {(3, 5)}   B) {(−4, 5)}

   C) {(−3, 4)}   D) ∅; inconsistent system

4

22) $-7x + 7y = 14$
   $4x + 5y = 28$
   A) $\{(2, 5)\}$ B) $\{(1, 5)\}$
   C) $\{(2, 4)\}$ D) $\varnothing$; inconsistent system

22) _____

Find the product.

23) $(5p + 9)(5p - 9)$

23) _____

    A) $25p^2 - 90p - 81$ B) $p^2 - 81$ C) $25p^2 + 90p - 81$ D) $25p^2 - 81$

24) $(9a + 2b)(8a - 9b)$

24) _____

    A) $72a^2 - 97ab - 18b^2$ B) $72a^2 - 65ab - 18b^2$
    C) $72a^2 - 18b^2$ D) $72a^2 + 65ab - 18b^2$

Factor the polynomial completely.

25) $15x^2 + 32x + 16$

25) _____

    A) $(3x + 4)(5x + 4)$ B) $(15x + 1)(x + 16)$ C) $(15x + 4)(x + 4)$ D) $(3x - 4)(5x - 4)$

26) $-60x^3 + 175x^2 - 125x$

26) _____

    A) $-5(3x^2 - 5)(4x - 5)$ B) $x(3x - 5)(-20x + 25)$
    C) $x(8x + 25)(4x - 5)$ D) $-5x(3x - 5)(4x - 5)$

Factor the trinomial completely.

27) $s^2t^2 - 5st + 31$

27) _____

    A) Prime   B) $(st + 31)(st - 1)$ C) $(st - 31)(st + 1)$ D) $(st - 31)(st - 1)$

Factor the polynomial.

28) $x^2 + 8xy + 16y^2$

28) _____

    A) $(x + 4)^2$ B) $(x - 4y)(x + 4y)$ C) $(x - 4y)^2$ D) $(x + 4y)^2$

Find all solutions by factoring.

29) $x^2 + 9x - 22 = 0$

29) _____

    A) $\{2, 11\}$ B) $\{-11, 2\}$ C) $\{-11, -2\}$ D) $\{-2, 11\}$

30) $11m^2 - 9m = 0$

30) _____

    A) $\{0\}$ B) $\left\{\dfrac{9}{11}, 0\right\}$ C) $\left\{\dfrac{9}{11}, -\dfrac{9}{11}\right\}$ D) $\left\{-\dfrac{9}{11}, 0\right\}$

31) $2x^2 + 14 = x^2 + 9x$

31) _____

    A) $\{7\}$ B) $\left\{\dfrac{9}{2}, -2\right\}$ C) $\{2, 7\}$ D) $\left\{7, \dfrac{9}{2}\right\}$

Perform the indicated operation and express in lowest terms.

32) $\dfrac{k^2 + 12k + 35}{k^2 + 14k + 49} \cdot \dfrac{k^2 + 7k}{k^2 - 3k - 40}$

32) _____

    A) $\dfrac{1}{k - 8}$ B) $\dfrac{k}{k^2 + 14k + 49}$ C) $\dfrac{k^2 + 7k}{k - 8}$ D) $\dfrac{k}{k - 8}$

33) $\dfrac{z^2 + 13z + 36}{z^2 + 16z + 63} \div \dfrac{z^2 + 4z}{z^2 + 2z - 35}$

    A) $z - 5$ B) $\dfrac{z - 5}{z^2 + 7z}$ C) $\dfrac{z - 5}{z}$ D) $\dfrac{z}{z^2 + 16z + 63}$

34) $\dfrac{2k^2 + 17kp + 21p^2}{9k^2 - 18kp + 8p^2} \div \dfrac{6k^2 + 17kp + 12p^2}{9k^2 - 16p^2}$

    A) -1 B) $\dfrac{k + 7p}{3k - 2p}$ C) $\dfrac{k + p}{3k + 2p}$ D) $\dfrac{k + 8p}{2k - 3p}$

Add or subtract as indicated. Write the answer in lowest terms.

35) $\dfrac{3}{y^2 - 3y + 2} + \dfrac{7}{y^2 - 1}$

    A) $\dfrac{10y - 11}{(y - 1)(y + 1)(y - 2)}$ B) $\dfrac{42y - 11}{(y - 1)(y + 1)(y - 2)}$

    C) $\dfrac{11y - 10}{(y - 1)(y + 1)(y - 2)}$ D) $\dfrac{10y - 11}{(y - 1)(y - 2)}$

36) $\dfrac{5}{x - 4} - \dfrac{7}{4 - x}$

    A) $\dfrac{-2}{x + 4}$ B) -1 C) $\dfrac{14}{x - 4}$ D) $\dfrac{12}{x - 4}$

Simplify the complex fraction.

37) $\dfrac{4 + \dfrac{2}{x}}{\dfrac{x}{3} + \dfrac{1}{6}}$

    A) 12 B) $\dfrac{x}{12}$ C) $\dfrac{12}{x}$ D) 1

38)

$\dfrac{\dfrac{6}{x} - \dfrac{x}{6}}{\dfrac{1}{6} - \dfrac{1}{x}}$

    A) $-(x - 6)$ B) $x + 6$ C) $-(x + 6)$ D) $6x(x + 6)$

Solve the equation.

39) $\dfrac{18}{x - 2} = 1 + \dfrac{20}{x + 2}$

    A) $\{8, -10\}$ B) $\{-8, 10\}$ C) $\varnothing$ D) $\{-20, 10\}$

40) $\dfrac{4x - 3}{2x + 1} = \dfrac{2x - 1}{x + 4}$

    A) $\left\{\dfrac{15}{13}\right\}$ B) $\{-1\}$ C) $\left\{\dfrac{11}{13}\right\}$ D) $\emptyset$

40) _____

Solve the problem. Round your answer, as needed.

41) Maria and Charlie can deliver 80 papers in 4 hours. How long would it take them to deliver 72 papers?

    A) 4.5 hours   B) 4.4 hours   C) 3.6 hours   D) 288 hours

41) _____

Solve the problem.

42) Chuck and Dana agree to meet in Chicago for the weekend. Chuck travels 162 miles in the same time that Dana travels 150 miles. If Chuck's rate of travel is 4 mph more than Dana's, and they travel the same length of time, at what speed does Chuck travel?

    A) 59 mph   B) 49 mph   C) 50 mph   D) 54 mph

42) _____

43) A boat goes 350 miles downstream in the same time it can go 300 miles upstream. The speed of the current is 7 miles per hour. Find the speed of the boat in still water.

    A) 91 mph   B) 65 mph   C) 98 mph   D) 84 mph

43) _____

44) Frank can type a report in 2 hours and James takes 3 hours. How long will it take the two of them typing together?

    A) $\dfrac{5}{6}$ hr   B) $\dfrac{6}{5}$ hr   C) 6 hr   D) 3 hr

44) _____

45) One maid can clean the house three times faster than another. Working together they can clean the entire house in 3 hours. How long would it take the faster maid cleaning alone?

    A) 5 hr   B) $\dfrac{3}{4}$ hr   C) 3 hr   D) 4 hr

45) _____

Simplify the root.

46) $\sqrt[3]{x^{21}}$

    A) $-\left|x^7\right|$ B) $\left|x^7\right|$ C) $-x^7$ D) x^7

46) _____

Use the rules of exponents to simplify the expression. Write the answer with positive exponents. Assume that all variables represent positive real numbers.

47) $(b^4)^{3/4}$

    A) $b^{3/16}$ B) $b^{7/4}$ C) $b^{1/4}$ D) b^3

47) _____

Write with radicals. Assume that all variables represent positive real numbers.
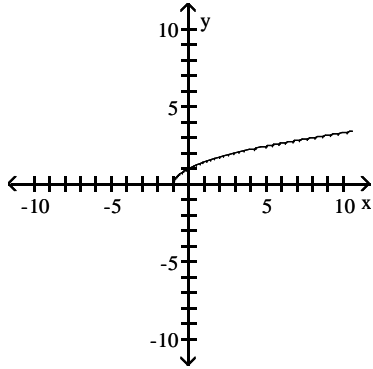
48) $(9py^2)^{1/7}$

    A) $\sqrt{9py^2}$ B) $\sqrt[7]{9py}$ C) $\sqrt[9]{9py}$ D) $\sqrt[7]{9py^2}$

48) _____

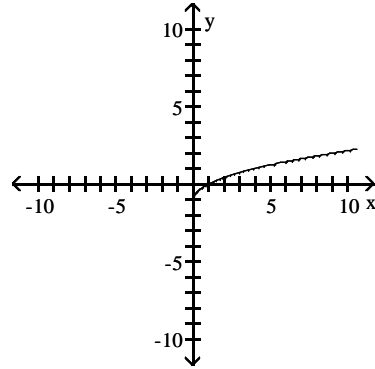**Graph the function and give its domain and its range.**
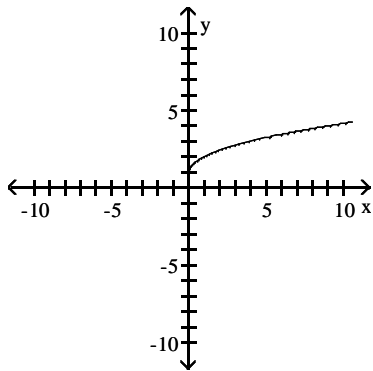
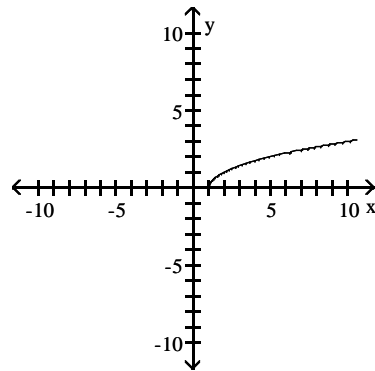49) $f(x) = \sqrt{x} - 1$

A) $[-1, \infty)$; $[0, \infty)$

B) $[0, \infty)$; $[-1, \infty)$

C) $[0, \infty)$; $[1, \infty)$

D) $[1, \infty)$; $[0, \infty)$

Simplify the radical. Assume that all variables represent positive real numbers.

50) $\sqrt[4]{\dfrac{4y^7}{1024y^3}}$

A) $\dfrac{y}{4}$

B) $4y$

C) $\dfrac{y^2}{16}$

D) $\dfrac{y}{\sqrt[4]{64}}$

Simplify. Assume that all variables represent positive real numbers.

51) $3\sqrt[3]{125x} + 3\sqrt[3]{27x}$

A) $8\sqrt[3]{x}$

B) $3\sqrt[3]{152x}$

C) $24\sqrt[3]{x}$

D) $24x$

52) $20\sqrt[3]{2} - 5\sqrt[3]{250}$

A) $-5\sqrt[3]{2}$

B) $15\sqrt[3]{2}$

C) $20\sqrt[3]{2} - 5\sqrt[3]{250}$

D) $5\sqrt[3]{2}$

Multiply, then simplify the product. Assume that all variables represent positive real numbers.

53) $(\sqrt{3x} + 3)(\sqrt{7x} - 3)$

A) $x\sqrt{21} + \sqrt{7x} - 9$

B) $x\sqrt{21} - 3\sqrt{3x} + 3\sqrt{7x} - 9$

C) $x\sqrt{7} - 9$

D) $x\sqrt{21} - 9$

Rationalize the denominator. Assume that all variables represent positive real numbers and that the denominator is not zero.

54) $\dfrac{\sqrt{5}}{\sqrt{11} + 2}$

54) _____

  A) $\dfrac{\sqrt{55} - 2\sqrt{5}}{7}$ B) $\dfrac{\sqrt{55} - 2\sqrt{5}}{13}$ C) $\dfrac{\sqrt{55} + 2\sqrt{5}}{7}$ D) $\dfrac{3\sqrt{55} + 115}{22}$

55) $\dfrac{\sqrt{x} - \sqrt{y}}{\sqrt{5x} + \sqrt{6y}}$

55) _____

  A) $\dfrac{\sqrt{5x} - \sqrt{11xy} + \sqrt{6y}}{5x - 6y}$ B) $\dfrac{x\sqrt{5} - \sqrt{6xy} - \sqrt{5xy} + y\sqrt{6}}{5x - 6y}$

  C) $\dfrac{\sqrt{5x} - \sqrt{11xy} + \sqrt{6y}}{5x + 6y}$ D) $\dfrac{x\sqrt{5} - \sqrt{6xy} - \sqrt{5xy} + y\sqrt{6}}{5x + 6y}$

Solve the equation.

56) $\sqrt{3x - 3} - 10 = 0$

56) _____

  A) $\varnothing$ B) $\left\{\dfrac{13}{3}\right\}$ C) $\left\{\dfrac{103}{3}\right\}$ D) $\{100\}$

57) $\sqrt{x} + 3 = 0$

57) _____

  A) $\{9\}$ B) $\{\sqrt{3}\}$ C) $\{-9\}$ D) $\varnothing$

Multiply.

58) $(5 - 7i)(7 - 4i)$

58) _____

  A) $28i^2 - 69i + 35$ B) $7 - 69i$ C) $63 - 29i$ D) $7 + 69i$

Write the expression in the form a + bi.

59) $\dfrac{6 + 2i}{9 - 3i}$

59) _____

  A) $\dfrac{5}{6} - \dfrac{1}{12}i$ B) $\dfrac{14}{15}$ C) $-\dfrac{48}{65} - \dfrac{36}{65}i$ D) $\dfrac{8}{15} + \dfrac{2}{5}i$

Solve the equation by completing the square.

60) $p^2 + 3p - 9 = 0$

60) _____

  A) $\left\{\dfrac{-3 + 3\sqrt{5}}{2}, \dfrac{-3 - 3\sqrt{5}}{2}\right\}$ B) $\left\{\dfrac{3 + 3\sqrt{5}}{2}\right\}$

  C) $\left\{-3 + 3\sqrt{5}, -3 - 3\sqrt{5}\right\}$ D) $\left\{\dfrac{-3 - 3\sqrt{5}}{2}\right\}$

Use the quadratic formula to solve the equation. (All solutions are real numbers.)

61) $2n^2 = -10n - 7$

61) _____

  A) $\left\{\dfrac{-5 + \sqrt{39}}{2}, \dfrac{-5 - \sqrt{39}}{2}\right\}$ B) $\left\{\dfrac{-5 + \sqrt{11}}{4}, \dfrac{-5 - \sqrt{11}}{4}\right\}$

  C) $\left\{\dfrac{-10 + \sqrt{11}}{2}, \dfrac{-10 - \sqrt{11}}{2}\right\}$ D) $\left\{\dfrac{-5 + \sqrt{11}}{2}, \dfrac{-5 - \sqrt{11}}{2}\right\}$

Use the quadratic formula to solve the equation.
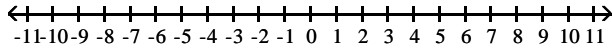
62) $8x^2 + 7x = -2$

62) _____

A) $\left\{ \dfrac{-7 + i\sqrt{15}}{16}, \dfrac{-7 - i\sqrt{15}}{16} \right\}$

B) $\left\{ \dfrac{7 + \sqrt{15}}{16}, \dfrac{7 - \sqrt{15}}{16} \right\}$

C) $\left\{ \dfrac{-7 + \sqrt{15}}{16}, \dfrac{-7 - \sqrt{15}}{16} \right\}$

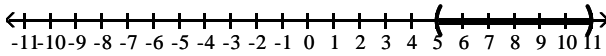D) $\left\{ \dfrac{7 + i\sqrt{15}}{16}, \dfrac{7 - i\sqrt{15}}{16} \right\}$
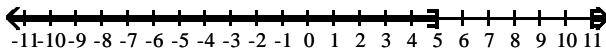
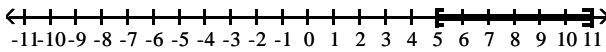**Solve, and graph the solution set.**

63) $\dfrac{6}{p - 5} < 1$

63) _____

A) (5, 11)

B) $(-\infty, 5] \cup [11, \infty)$

C) [5, 11]

D) $(-\infty, 5) \cup (11, \infty)$

10

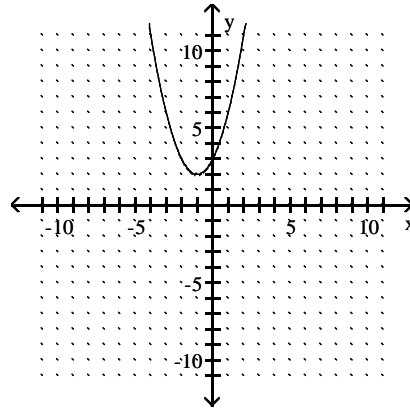**Graph the parabola. Identify the vertex, axis, domain and range.**

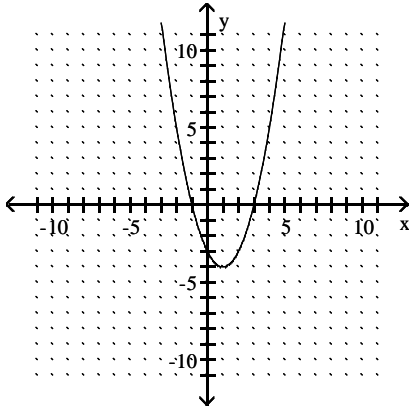64) $f(x) = -x^2 + 2x - 3$ 64) _____

   A) Vertex: (1, –6); Axis: x = 1;
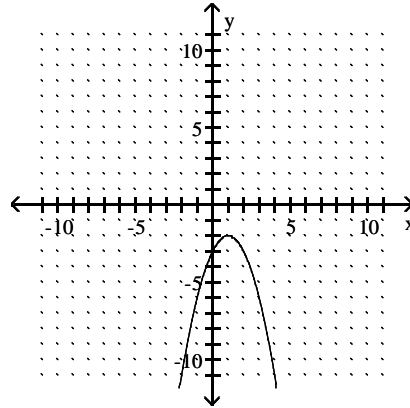   Domain: (–∞, ∞); Range: [–4, ∞)

   B) Vertex: (–1, –4); Axis: x = –1;
      Domain: (–∞, ∞); Range: [–4, ∞)

   C) Vertex: (1, –6); Axis: x = 1;
      Domain: (–∞, ∞); Range: [–4, ∞)

   D) Vertex: (1, –2); Axis: x = 1;
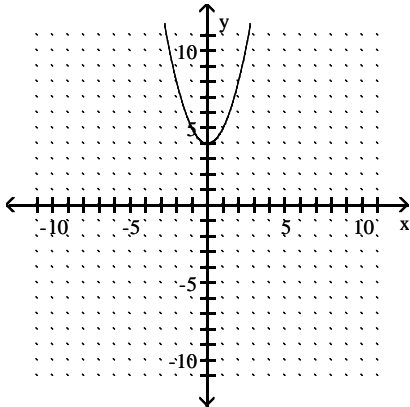   Domain: (–∞, ∞); Range: (–∞, –2]

11

Sketch the graph of the parabola. Identify the vertex and axis of symmetry.
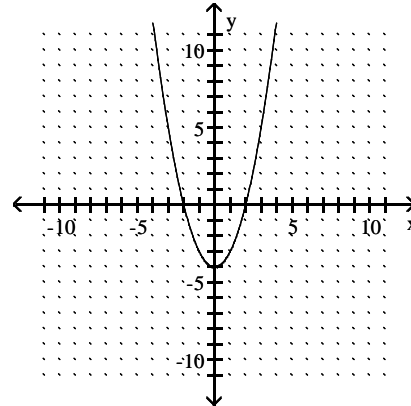
65) $f(x) = (x - 4)^2$

65) _____
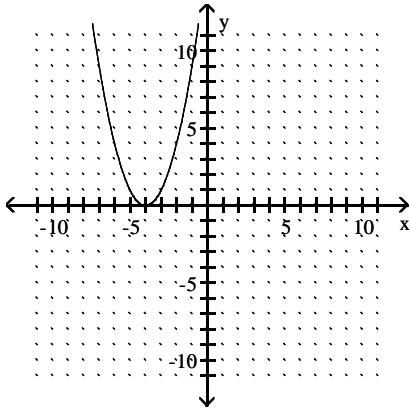
A)
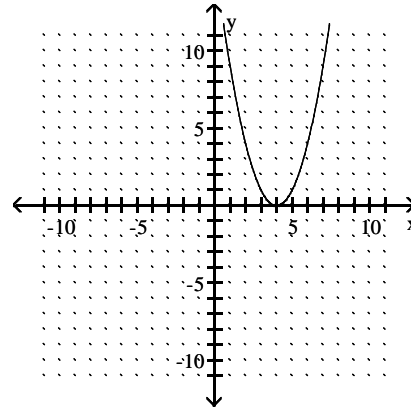
B)

C)

D)

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

66) $f(x) = 3x^2 - 6$

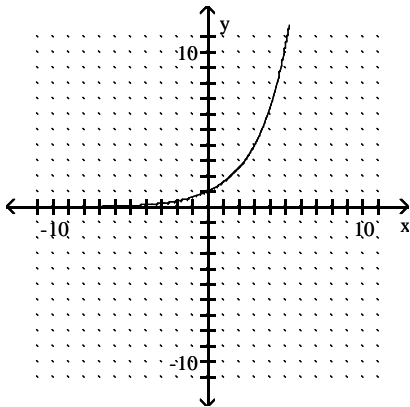66) _____

   A) Yes   B) No

67)

67) _____

A) Yes   B) No

12

If the following defines a one–to–one function, find its inverse. If not, write "Not one–to–one."

68) $f(x) = x^3 - 10$

    A) $f^{-1}(x) = \pm\sqrt[3]{x + 10}$ B) $f^{-1}(x) = \sqrt[3]{x + 10}$

    C) Not one–to–one   D) $f^{-1}(x) = x + 10$

68) _____

69) $f(x) = \sqrt{x - 8}$

    A) Not one–to–one   B) $f^{-1}(x) = x^2 + 8, x \geq 0$

    C) $f^{-1}(x) = (x - 8)^2$ D) $f^{-1}(x) = \sqrt{x + 8}$
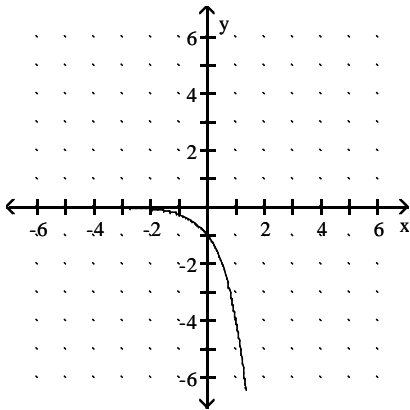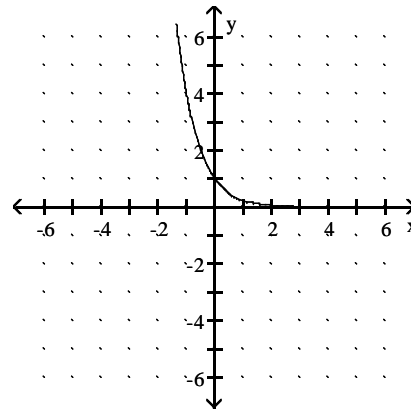
69) _____

Graph the function.

70) $f(x) = \left(\dfrac{1}{4}\right)^x$

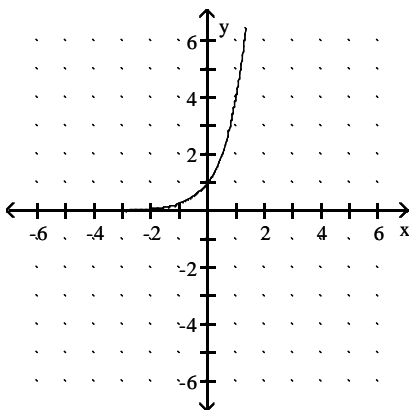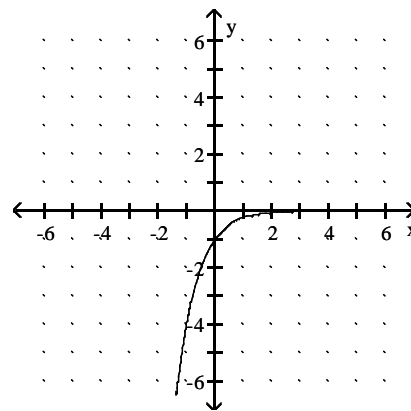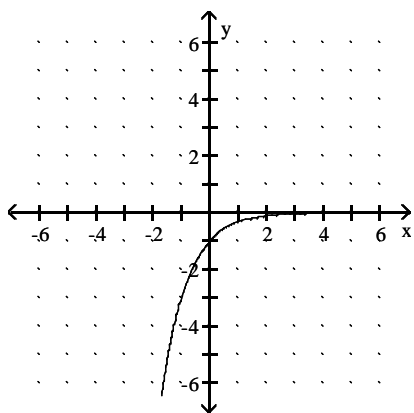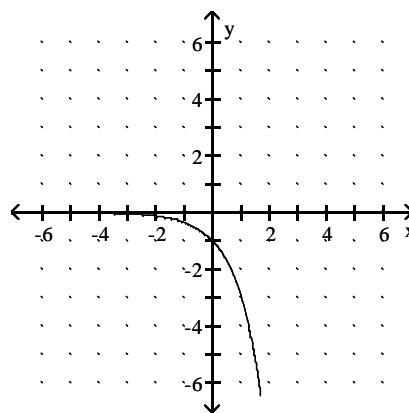70) _____

A)

B)

C)

D)

13

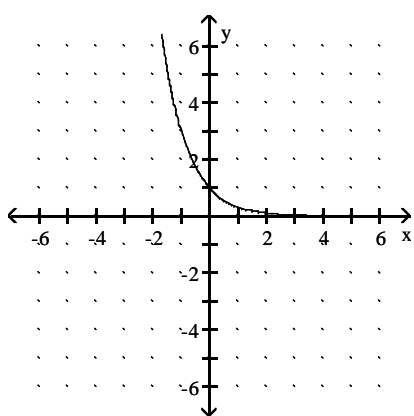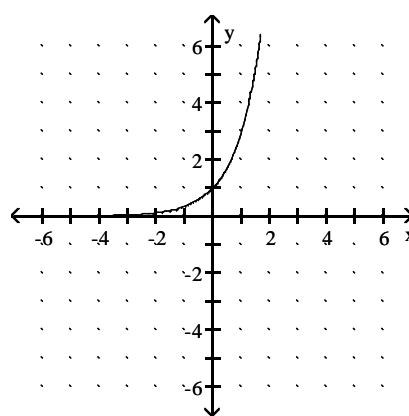71) $f(x) = 3^x$ 71) _____

A)

B)

C)

D)

Evaluate the logarithm.

72) $\log_{1/2} 2$ 72) _____

   A) 2   B) –1   C) 1   D) –2

73) $\log_{\sqrt{6}} \sqrt{6}$ 73) _____

   A) 1   B) –2   C) $-\dfrac{1}{2}$ D) –1

Write in logarithmic form.

74) $16^{3/4} = 8$ 74) _____

   A) $\log_8 16 = \dfrac{3}{4}$ B) $\dfrac{\log_4 8}{\log_3 16} = 16$ C) $\log_{16} 8 = \dfrac{3}{4}$ D) $\log_3 16 = \dfrac{3}{4}$

75) $8^{-4/3} = \dfrac{1}{16}$ 75) _____

   A) $\log_8\left(\dfrac{1}{16}\right) = -\dfrac{4}{3}$ B) $\log_{4/3} 16 = 8$ C) $\log_{16} 8 = -\dfrac{4}{3}$ D) $\log_8\left(\dfrac{4}{3}\right) = -\dfrac{1}{16}$

14

Write in exponential form.

76) $\log_{1/5} 25 = -2$

A) $(-2)^{1/5} = 25$ B) $\left(\dfrac{1}{5}\right)^2 = 25$ C) $25^{1/5} = 2$ D) $\left(\dfrac{1}{5}\right)^{-2} = 25$

76) _____

Solve the equation.

77) $\log_x\left(\dfrac{9}{16}\right) = 2$

A) $\{2\}$ B) $\left\{\dfrac{3}{4}\right\}$ C) $\{9\}$ D) $\left\{\dfrac{4}{3}\right\}$

77) _____

78) $\log_3 (7x - 5) = 1$

A) $\{1\}$ B) $\left\{\dfrac{8}{7}\right\}$ C) $\left\{\dfrac{4}{3}\right\}$ D) $\varnothing$

78) _____

Rewrite the given expression as a single logarithm. Assume that all variables are defined in such a way that variable expressions are positive and bases are positive numbers not equal to 1.

79) $6 \log_q q - \log_q r$

A) $\log_q \dfrac{q^6}{r}$ B) $\log_q (q^6 - r)$ C) $\log_q q^6 \div \log_b r$ D) $\log_q \dfrac{6q}{r}$

79) _____

Express the given logarithm as a sum and/or difference of logarithms. Simplify, if possible. Assume that all variables represent positive real numbers.

80) $\log_{13} \dfrac{11\sqrt{m}}{n}$

A) $\log_{13} 11 + \dfrac{1}{2} \log_{13} m - \log_{13} n$ B) $\log_{13} (11\sqrt{m}) - \log_{13} n$

C) $\log_{13} n - \log_{13} 11 - \dfrac{1}{2} \log_{13} m$ D) $\log_{13} 11 \cdot \dfrac{1}{2} \log_{13} m \div \log_{13} n$

80) _____

Provide an appropriate response.

81) Use a property of logarithms to evaluate $\log_3 3^{17}$.

A) $\dfrac{1}{17}$ B) $\dfrac{1}{3}$ C) 17 D) 3

81) _____

1) A
2) B
3) B
4) B
5) D
6) D
7) C
8) A
9) B
10) A
11) B
12) C
13) D
14) D
15) C
16) B
17) C
18) A
19) B
20) B
21) C
22) C
23) D
24) B
25) A
26) D
27) A
28) D
29) B
30) B
31) C
32) D
33) C
34) B
35) A
36) D
37) C
38) C
39) A
40) C
41) C
42) D
43) A
44) B
45) D
46) D
47) D
48) D
49) B
50) A

51) C
52) A
53) B
54) A
55) B
56) C
57) D
58) B
59) D
60) A
61) D
62) A
63) D
64) D
65) D
66) B
67) A
68) B
69) B
70) B
71) D
72) B
73) A
74) C
75) A
76) D
77) B
78) B
79) A
80) A
81) C