

The following problems are provided for additional practice in preparation for the Final Exam. You should not, however, rely solely upon these problems. You should also review your old tests and notes from the class to fully and adequately prepare for the Final Exam.

Find an equation for the circle.

1) Endpoints of a diameter $(-4, 3), (-4, -3)$

- A) $(x - 3)^2 + y^2 = 16$ B) $(x + 4)^2 + y^2 = 9$ C) $x^2 + (y - 3)^2 = 16$ D) $(x + 4)^2 + y^2 = 3$

2) Endpoints of a diameter $(-1, 6), (9, -2)$

- A) $(x - 2)^2 + (y - 4)^2 = 41$ B) $(x - 4)^2 + (y - 2)^2 = 41$
C) $(x - 4)^2 + y^2 = 16$ D) $x^2 + (y - 2)^2 = 25$

3) Center at $(5, -5)$, diameter of length 7.2

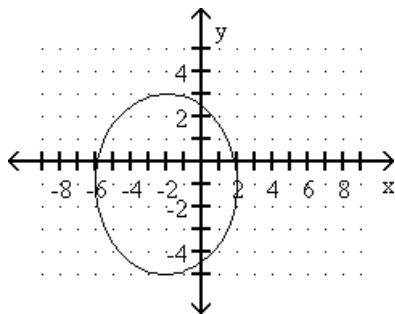
- A) $(x + 5)^2 - (y + 5)^2 = 51.84$ B) $(x - 5)^2 + (y - 5)^2 = 3.6$
C) $(x + 5)^2 + (y - 5)^2 = 12.96$ D) $(x - 5)^2 + (y + 5)^2 = 12.96$

4) Center at $(3, -4)$, radius of length $\frac{3}{4}$

- A) $(x - 3)^2 + (y + 4)^2 = \frac{9}{16}$ B) $(x + 3)^2 + (y - 4)^2 = \frac{16}{9}$
C) $(x - 3)^2 + (y - 4)^2 = \frac{9}{16}$ D) $(x + 3)^2 - (y + 4)^2 = 9$

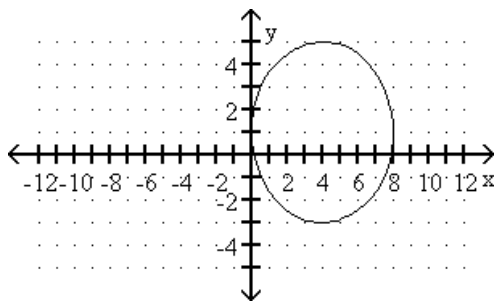
Find the equation of the circle. Express the equation in standard form

5)



- A) $(x + 2)^2 + (y - 1)^2 = 4^2$ B) $(x - 2)^2 + (y + 1)^2 = 4^2$
C) $(x - 2)^2 + (y - 1)^2 = 4^2$ D) $(x + 2)^2 + (y + 1)^2 = 4^2$

6)



- A) $(x - 4)^2 + (y + 1)^2 = 4^2$ B) $(x + 4)^2 + (y + 1)^2 = 4^2$
C) $(x - 4)^2 + (y - 1)^2 = 4^2$ D) $(x + 4)^2 + (y - 1)^2 = 4^2$

Evaluate as requested.

7) Given that $f(x) = x^2 - 3x + 5$, find $f(-1)$.

A) 3

B) 9

C) -1

D) -7

8) Given that $f(x) = x^2 + 5x + 2$, find $f(-2)$.

A) -4

B) 12

C) -8

D) 16

Solve the problem.

9) The mathematical model $C = 300x + 60,000$ represents the cost in dollars a company has in manufacturing x items during a month. How many items were produced if costs reached \$270,000?

A) 700 items

B) 500 items

C) 1100 items

D) 269,700 items

10) Suppose the sales of a particular brand of appliance satisfy the relationship $S(x) = 110x + 1700$, where $S(x)$ represents the number of sales in year x , with $x = 0$ corresponding to 1982. In what year would the sales be 2690?

A) 1991

B) 1990

C) 1993

D) 1988

Determine the equation of the line described. Put answer in the slope-intercept form, if possible.

11) Through $(-5, -3)$, perpendicular to $-5x + 6y = 7$

A) $y = -\frac{5}{6}x - 45$

B) $y = -\frac{6}{5}x$

C) $y = -\frac{6}{5}x - 9$

D) $y = \frac{6}{5}x + 9$

12) Through $(-2, -12)$, parallel to $-9x + 4y = -10$

A) $y = \frac{4}{9}x + \frac{4}{3}$

B) $y = \frac{9}{4}x - \frac{15}{2}$

C) $y = -\frac{9}{4}x + \frac{15}{2}$

D) $y = \frac{1}{2}x - \frac{5}{2}$

Solve using the substitution method.

13) $x + y = 3$

$x - y = -15$

A) (6, 10)

B) (-6, 9)

C) (-7, 10)

D) No solution

14) $x + 9y = 11$

$5x + 45y = 55$

A) (5, 5)

C) No solution

B) (0, 0)

D) Infinitely many solutions

Solve using the elimination method.

15) $x - 6y = 18$

$-5x - 5y = 15$

A) (3, 0)

B) (1, -4)

C) (0, -3)

D) No solution

16) $9x - 5y = -11$

$-4x - 2y = -12$

A) (0, 5)

B) (1, 4)

C) (1, 5)

D) No solution

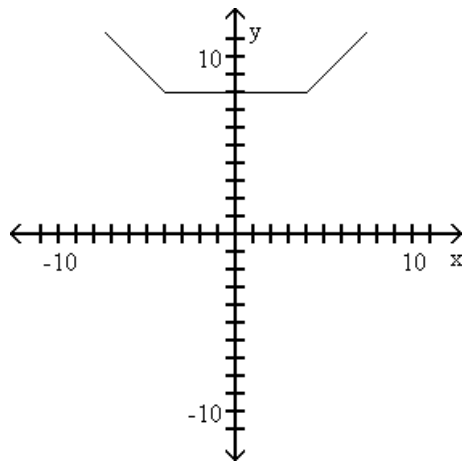
Solve.

- 17) Tickets for the school play cost \$5 for students and \$8 for adults. On opening night, all 360 seats were filled, and the box office revenues were \$2610. How many student and how many adult tickets were sold?
- A) 90 student and 270 adult
B) 360 student and 0 adult
C) 320 adult and 40 student
D) 90 adult and 270 student

- 18) A student takes out two loans totaling \$11,000 to help pay for college expenses. One loan is at 5% simple interest, and the other is at 4% simple interest. The first-year interest is \$470. Find the amount of the loan at 4%.
- A) \$3000
B) \$150
C) \$8000
D) \$320

Determine the intervals on which the function is increasing, decreasing, and constant.

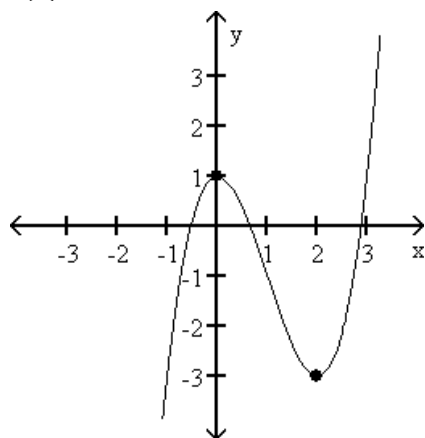
19)



- A) Increasing on $(-\infty, 4)$; Decreasing on $(-4, \infty)$; Constant on $(4, \infty)$
B) Increasing on $(-\infty, 4)$; Decreasing on $(-\infty, -4)$; Constant on $(4, \infty)$
C) Increasing on $(4, \infty)$; Decreasing on $(-4, \infty)$; Constant on $(-4, 4)$
D) Increasing on $(4, \infty)$; Decreasing on $(-\infty, -4)$; Constant on $(-4, 4)$

Using the graph, determine any relative maxima and relative minima of the function.

20) $f(x) = x^3 - 3x^2 + 1$



- A) Relative maximum: none; Relative minimum: -3 at $x = 2$
B) Relative maximum: -3 at $x = 2$; Relative minimum: 1 at $x = 0$
C) Relative maximum: 1 at $x = 0$; Relative minimum: -3 at $x = 2$
D) Relative maximum: 1 at $x = 0$; Relative minimum: none

For the piecewise function, find the specified function value.

$$21) f(x) = \begin{cases} 6x, & \text{for } x \leq -1, \\ x - 7, & \text{for } x > -1 \end{cases}$$

$f(-8)$

A) -15

B) 48

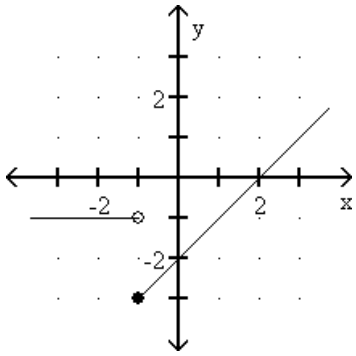
C) -48

D) 1

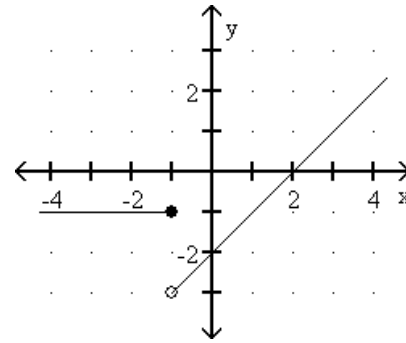
Graph the function.

$$22) f(x) = \begin{cases} -1, & \text{for } x \geq 1, \\ -2 - x, & \text{for } x < 1 \end{cases}$$

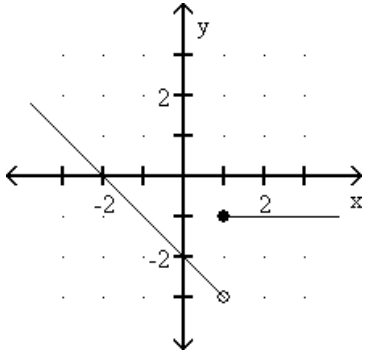
A)



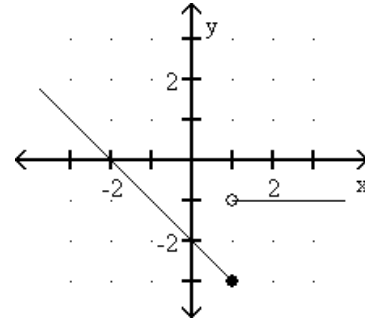
B)



C)

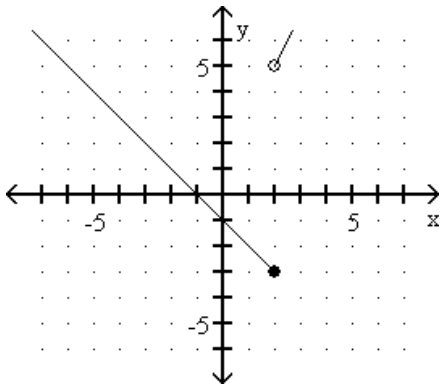


D)

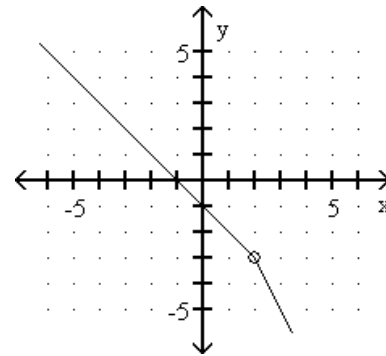


$$23) f(x) = \begin{cases} -1 - x, & \text{for } x \leq 2, \\ 1 - 2x, & \text{for } x > 2 \end{cases}$$

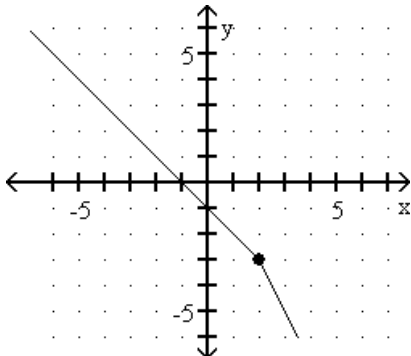
A)



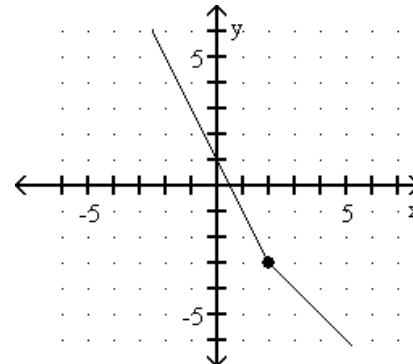
B)



C)



D)



For the pair of functions, find the indicated sum, difference, product, or quotient.

24) $f(x) = 9x - 8$, $g(x) = 6x - 4$

Find $(f - g)(x)$.

A) $15x - 12$

B) $3x - 4$

C) $-3x + 4$

D) $3x - 12$

25) $f(x) = 4 - 3x$, $g(x) = -7x + 3$

Find $(f + g)(x)$.

A) $-7x + 4$

B) $-3x$

C) $-10x + 7$

D) $4x + 7$

26) $f(x) = 4x - 3$, $g(x) = 8x - 1$

Find $(fg)(x)$.

A) $12x^2 - 28x - 4$

B) $32x^2 + 3$

C) $32x^2 - 25x + 3$

D) $32x^2 - 28x + 3$

27) $f(x) = 7x - 3$, $g(x) = 5x - 2$

Find $(f/g)(x)$.

A) $\frac{5x - 2}{7x - 3}$

B) $\frac{5x + 2}{7x + 3}$

C) $\frac{7x - 3}{5x - 2}$

D) $\frac{7x + 3}{5x + 2}$

For the pair of functions, find the indicated domain.

28) $f(x) = 2x - 5$, $g(x) = \sqrt{x + 8}$

Find the domain of f/g .

A) $[0, \infty)$

B) $(-8, \infty)$

C) $[8, \infty)$

D) $(-8, 8)$

29) $f(x) = x^2 - 25$, $g(x) = 2x + 3$

Find the domain of $f - g$.

A) $(-5, 5)$

B) $[0, \infty)$

C) $[5, \infty)$

D) $(-\infty, \infty)$

30) $f(x) = x^2 - 4$, $g(x) = 2x + 3$

Find the domain of f/g .

A) $(-\infty, \infty)$

B) $\left[-\frac{3}{2}, \infty\right)$

C) $(-2, 2)$

D) $\left(-\infty, -\frac{3}{2}\right) \cup \left(-\frac{3}{2}, \infty\right)$

For the function f , construct and simplify the difference quotient $\frac{f(x+h) - f(x)}{h}$.

31) $f(x) = 3x^2 + 4x$

A) $6x + 3h + 4$

B) $6x + 4$

C) $6x^2 + 3h + 4x$

D) $9x - 5h + 8$

32) $f(x) = 9x^2 + 9x$

A) $18x + 9$

B) $27x - 11h + 18$

C) $18x^2 + 9h + 9x$

D) $18x + 9h + 9$

Find the requested function value.

33) $f(x) = \frac{x - 3}{5}$, $g(x) = 4x + 1$

Find $(g \circ f)(-7)$.

A) -6

B) -7

C) 54

D) -10

34) $f(x) = \frac{x - 7}{9}$, $g(x) = 7x + 9$

Find $(g \circ f)(-20)$.

A) $-\frac{46}{3}$

B) -12

C) 393

D) -48

For the pair of functions, find the indicated composition.

35) $f(x) = 5x + 11$, $g(x) = 4x - 1$

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

A) $20x + 16$

B) $20x + 10$

C) $20x + 6$

D) $20x + 43$

36) $f(x) = \frac{x - 10}{7}$, $g(x) = 7x + 10$

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

A) x

B) $x - \frac{10}{7}$

C) $x + 20$

D) $7x + 60$

For the pair of functions, find the indicated domain.

37) $f(x) = \frac{4}{x + 3}$, $g(x) = x + 5$

Find the domain of $f \circ g$.

A) $(-\infty, -8) \cup (-8, \infty)$

B) $(-\infty, \infty)$

C) $(-\infty, -8] \cup [-8, \infty)$

D) $(-\infty, -3) \cup (-3, \infty)$

38) $f(x) = \frac{8}{x + 10}$, $g(x) = x + 5$

Find the domain of $g \circ f$.

A) $(-\infty, -10] \cup [-10, \infty)$

B) $(-\infty, -15) \cup (-15, \infty)$

C) $(-\infty, \infty)$

D) $(-\infty, -10) \cup (-10, \infty)$

Answer the question.

39) How can the graph of $f(x) = -\sqrt{x + 7}$ be obtained from the graph of $y = \sqrt{x}$?

A) Shift it horizontally 7 units to the left. Reflect it across the y-axis.

B) Shift it horizontally 7 units to the right. Reflect it across the x-axis.

C) Shift it horizontally 7 units to the left. Reflect it across the x-axis.

D) Shift it horizontally -7 units to the left. Reflect it across the x-axis.

40) How can the graph of $f(x) = \frac{1}{2}(x + 7)^2 - 6$ be obtained from the graph of $y = x^2$?

A) Shift it horizontally 7 units to the left. Shrink it vertically by a factor of $\frac{1}{2}$. Shift it 6 units down.

B) Shift it horizontally 7 units to the left. Shrink it vertically by a factor of 2. Shift it 6 units down.

C) Shift it horizontally 7 units to the right. Stretch it vertically by a factor of 2. Shift it 6 units up.

D) Shift it horizontally 7 units to the right. Shrink it vertically by a factor of $\frac{1}{2}$. Shift it 6 units down.

- 41) How can the graph of $f(x) = -(x - 9)^2 + 8$ be obtained from the graph of $y = x^2$?
- A) Shift it horizontally 9 units to the right. Reflect it across the y-axis. Shift it 8 units up.
 - B) Shift it horizontally 9 units to the right. Reflect it across the y-axis. Shift it 8 units down.
 - C) Shift it horizontally 9 units to the left. Reflect it across the x-axis. Shift it 8 units up.
 - D) Shift it horizontally 9 units to the right. Reflect it across the x-axis. Shift it 8 units up.

Simplify. Write your answers in the form of $a+bi$, where a and b are real numbers.

- 42) $\frac{7+i}{-5-6i}$
- A) $-\frac{41}{61} - \frac{37}{61}i$
 - B) $-\frac{41}{61} + \frac{37}{61}i$
 - C) $-\frac{41}{61}$
 - D) $\frac{37}{61}i$
- 43) $\frac{8-i}{-4+7i}$
- A) $\frac{3}{5} - \frac{4}{5}i$
 - B) $-\frac{3}{5} - \frac{4}{5}i$
 - C) $-\frac{4}{5}i$
 - D) $\frac{1}{65} - \frac{4}{5}i$

Solve.

- 44) $x^2 - 6x - 27 = 0$
- A) $-24, -3$
 - B) $\sqrt{-27}, -\sqrt{-27}$
 - C) $9, -3$
 - D) $-9, 3$

Use the quadratic formula to find the exact solutions.

- 45) $x^2 - 14x + 74 = 0$
- A) $14 \pm 10i$
 - B) $-7 \pm 5i$
 - C) $7 \pm 5i$
 - D) $12, 2$
- 46) $x^2 = 15 + 3x$
- A) $\frac{3 \pm \sqrt{69}}{2}$
 - B) $\frac{3}{2} \pm \frac{\sqrt{69}}{2}i$
 - C) $3 \pm \sqrt{69}i$
 - D) $3, 15$
- 47) $4x^2 - 7x = 1$
- A) $-\frac{7}{8} \pm \frac{\sqrt{65}}{8}i$
 - B) $\frac{7}{8} \pm \frac{\sqrt{65}}{8}i$
 - C) $\frac{7 \pm \sqrt{65}}{8}$
 - D) $\frac{-7 \pm \sqrt{65}}{8}$

Find the vertex of the parabola.

- 48) $f(x) = 3x^2 - 18x + 25$
- A) $(-2, 3)$
 - B) $(2, -3)$
 - C) $(-3, 2)$
 - D) $(3, -2)$
- 49) $g(x) = x^2 - 9x + 12$
- A) $\left(\frac{9}{2}, -\frac{33}{4}\right)$
 - B) $\left(\frac{9}{4}, \frac{39}{2}\right)$
 - C) $\left(\frac{9}{2}, \frac{291}{4}\right)$
 - D) $\left(-\frac{9}{2}, \frac{291}{4}\right)$

Find the range of the given function.

- 50) $f(x) = 4x^2 - 8x + 1$
- A) $(-\infty, 3]$
 - B) $[-3, \infty)$
 - C) $[1, \infty)$
 - D) $(-\infty, -1]$

51) $f(x) = -4x^2 - 40x - 104$

A) $(-\infty, -4]$

B) $[4, \infty)$

C) $(-\infty, -5]$

D) $[5, \infty)$

Find the intervals on which the function is increasing and the intervals on which the function is decreasing.

52) $f(x) = x^2 - 12x + 11$

A) Increasing on $(-\infty, 6)$; decreasing on $(6, \infty)$

B) Increasing on $(-\infty, -6)$; decreasing on $(-6, \infty)$

C) Increasing on $(-6, \infty)$; decreasing on $(-\infty, -6)$

D) Increasing on $(6, \infty)$; decreasing on $(-\infty, 6)$

53) $f(x) = -x^2 + 10x + 24$

A) Increasing on $(-5, \infty)$; decreasing on $(-\infty, -5)$

B) Increasing on $(-\infty, 5)$; decreasing on $(5, \infty)$

C) Increasing on $(5, \infty)$; decreasing on $(-\infty, 5)$

D) Increasing on $(-\infty, -5)$; decreasing on $(-5, \infty)$

Solve.

54) $\frac{5x}{x-5} - \frac{4}{x} = \frac{20}{x^2 - 5x}$

Be sure to check that your answers are valid.

A) $\frac{4}{5}, -\frac{4}{5}$

B) $\frac{5}{4}$

C) $\frac{2}{5}, -\frac{2}{5}$

D) $\frac{4}{5}$

55) $\frac{6}{m+4} + \frac{7}{m} = \frac{4m+4}{m^2+4m}$

Be sure to check that your answers are valid.

A) $\frac{8}{3}$

B) $-\frac{8}{3}, 24$

C) $-\frac{8}{3}$

D) $-\frac{8}{3}, \frac{8}{3}$

56) $\sqrt{4q-3} = 3$

Be sure to check your answer.

A) 9

B) 3

C) $\frac{9}{4}$

D) $\frac{3}{2}$

57) $\sqrt[3]{x+1} = 2$

A) 3

B) 7

C) 8

D) 1

58) $x = \sqrt{x+13} + 7$

Be sure to check your answer.

A) -9

B) 12

C) 3

D) 3, 12

59) $|7x+3| = 4$

A) $-\frac{7}{3}, \frac{1}{3}$

B) $-\frac{1}{7}, 1$

C) No solution

D) $-1, \frac{1}{7}$

60) $|x-5| + 6 = 8$

A) -7, -3

B) No solution

C) 7

D) 3, 7

61) $|4x-7| \geq 9$

A) $(-\infty, -4] \cup [9, \infty)$

B) $\left[-\frac{1}{2}, 4\right]$

C) $\left(-\infty, -\frac{1}{2}\right] \cup [4, \infty)$

D) $[4, \infty)$

62) $|13x - 8| < -3$

A) $\left(-\infty, \frac{5}{13}\right) \cup \left(\frac{11}{13}, \infty\right)$

B) $\left(\frac{5}{13}, \frac{11}{13}\right)$

C) $(-\infty, \infty)$

D) No solution

63) $|6x + 7| < 3$

A) $\left(-\infty, -\frac{5}{3}\right) \cup \left(-\frac{2}{3}, \infty\right)$

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

C) $\left(-\infty, -\frac{5}{3}\right)$

D) $(-\infty, 6)$

Find the correct end behavior diagram for the given polynomial function.

64) $f(x) = 6x^3 + 6x^2 - 7x + 3$

A) ↖ ↘

B) ↗ ↘

C) ↖ ↗

D) ↖ ↖

65) $f(x) = -\frac{1}{7}x^3 + 2x^2 + 5x - 6$

A) ↗ ↗

B) ↖ ↗

C) ↖ ↖

D) ↖ ↘

66) $f(x) = 2.43x^4 + 7x^2 + x - 7$

A) ↖ ↗

B) ↖ ↖

C) ↗ ↗

D) ↖ ↘

67) $f(x) = -x^6 + 5x^5 - x^2 - 8x + 5$

A) ↖ ↘

B) ↖ ↖

C) ↖ ↗

D) ↗ ↗

Use synthetic division to find the quotient and the remainder.

68) $(x^3 - x^2 + 6) \div (x + 2)$

A) $Q(x) = (x^2 - 3x + 6); R(x) = -6$

B) $Q(x) = (3x^2 - 4x + 2); R(x) = 7$

C) $Q(x) = (x^2 + x + 2); R(x) = -6$

D) $Q(x) = (x^2 - 3x + 6); R(x) = 2$

69) $(2x^4 - x^3 - 15x^2 + 3x) \div (x + 3)$

A) $Q(x) = (2x^3 - 7x^2 + 6x - 15); R(x) = 45$

B) $Q(x) = (2x^3 - 5x^2 + 3); R(x) = 9$

C) $Q(x) = (2x^3 + 5x^2 + 3); R(x) = 9$

D) $Q(x) = (2x^3 - 7x^2 + 6x - 15); R(x) = -45$

70) $(3x^4 - 9x^3 + 2x^2 - 6x) \div (x - 3)$

A) $Q(x) = (3x^3 + x^2 - x + 3); R(x) = 9$

B) $Q(x) = (3x^3 + 2x); R(x) = 0$

C) $Q(x) = (3x^3 - 2x); R(x) = 0$

D) $Q(x) = (3x^2 + 2x); R(x) = 0$

Provide the requested response.

71) Suppose that a polynomial function of degree 4 with rational coefficients has 6, $4, \sqrt{5}$ as zeros. Find the other zero.

A) $\sqrt{5}i$

B) $-\sqrt{5}$

C) $i + \sqrt{5}$

D) -6

72) Suppose that a polynomial function of degree 5 with rational coefficients has 6, $-5 + 4i, 4 - \sqrt{6}$ as zeros. Find the other zeros.

A) $5 - 4i, -4 + \sqrt{6}$

B) $5 - 4i, 4 + \sqrt{6}$

C) $-5 - 4i, 4 + \sqrt{6}, -6$

D) $-5 - 4i, 4 + \sqrt{6}$

73) Suppose that a polynomial function of degree 6 with rational coefficients has $3i$, $-3 + 2i$, $2 - \sqrt{3}$ as zeros. Find the other zeros.

A) $3 - 2i$, $-2 + \sqrt{3}$

B) $-3i$, $3 - 2i$, $-2 + \sqrt{3}$

C) $-3i$, $-3 - 2i$, $2 + \sqrt{3}$

D) $-3 - 2i$, $2 + \sqrt{3}$

Find a polynomial function of lowest degree with rational coefficients that has the given numbers as some of its zeros.

74) $6i, \sqrt{5}$

A) $f(x) = x^4 - 62x^2 + 180$

B) $f(x) = x^4 - 31x^2 - 180$

C) $f(x) = x^4 + 62x^2 + 180$

D) $f(x) = x^4 + 31x^2 - 180$

75) $-4i, \sqrt{2}$

A) $f(x) = x^4 - 28x^2 + 32$

B) $f(x) = x^4 + 14x^2 - 32$

C) $f(x) = x^4 - 14x^2 - 32$

D) $f(x) = x^4 + 28x^2 + 32$

State the domain of the rational function.

76) $f(x) = \frac{17}{7 - x}$

A) $(-\infty, -17) \cup (-17, 17) \cup (17, \infty)$

B) $(-\infty, -7) \cup (-7, 7) \cup (7, \infty)$

C) $(-\infty, 17) \cup (17, \infty)$

D) $(-\infty, 7) \cup (7, \infty)$

77) $f(x) = \frac{x - 1}{x^2 - 9}$

A) $(-\infty, \infty)$

B) $(-\infty, -3) \cup (-3, \infty)$

C) $(-\infty, 1) \cup (1, \infty)$

D) $(-\infty, -3) \cup (-3, 3) \cup (3, \infty)$

Find the vertical asymptote(s) of the graph of the given function.

78) $f(x) = \frac{x - 11}{x^2 - 1}$

A) $x = 1, x = -1$

B) $y = 1, y = -1$

C) $x = 11$

D) $x = 1$

79) $f(x) = \frac{x^2 + 2x}{x^2 - 7x - 18}$

A) $x = 9, x = -2$

B) $x = 9$

C) $x = -9, x = 2$

D) None

80) $f(x) = \frac{x^2 + 2x - 8}{x^2 - 4x - 12}$

A) $x = 2, x = -6$

B) $x = 6$

C) $x = -2, x = 6$

D) $y = -2, y = 6$

Find the horizontal asymptote, if any, of the rational function.

81) $f(x) = \frac{x + 9}{9x^2 + 8x - 6}$

A) $y = \frac{1}{9}$

B) $y = 1$

C) $y = 0$

D) None

$$82) f(x) = \frac{3x^2 + 8}{x^2 - 8}$$

A) $y = 0$

B) $y = 8$

C) $y = 3$

D) None

$$83) f(x) = \frac{2x^3 - 5x - 3}{3x^3 - 9x + 4}$$

A) $y = \frac{2}{3}$

B) $y = \frac{5}{9}$

C) $y = 0$

D) None

Solve the inequality.

84) For the function $f(x) = x^2 - 4x - 12$, solve $f(x) \leq 0$.

A) $[6, \infty)$

B) $[-2, 6]$

C) $(-\infty, -2]$

D) $(-\infty, -2] \cup [6, \infty)$

85) For the function $f(x) = x^2 + 2x - 35$, solve $f(x) > 0$.

A) $(-\infty, -7)$

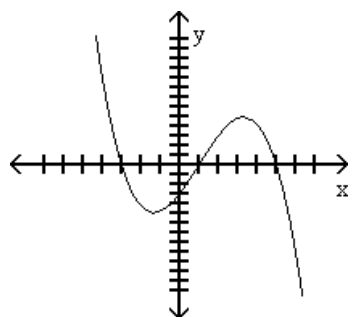
B) $(5, \infty)$

C) $(-\infty, -7) \cup (5, \infty)$

D) $(-7, 5)$

Solve the given inequality (a related function is graphed).

86) $-x^3 + 3x^2 + 13x - 15 < 0$



x-intercepts: $(-3, 0)$, $(1, 0)$, $(5, 0)$

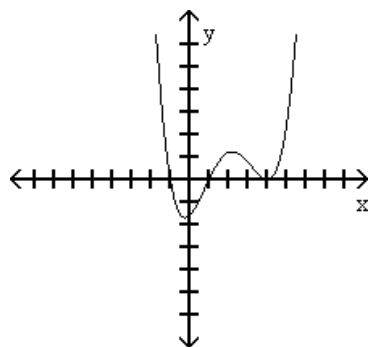
A) $[-3, 1] \cup [5, \infty)$

B) $(-\infty, -3) \cup (1, 5)$

C) $(-3, 1) \cup (5, \infty)$

D) $(5, \infty)$

87) $x^4 - 8x^3 + 15x^2 + 8x - 16 \geq 0$



x-intercepts: $(-1, 0)$, $(1, 0)$, $(4, 0)$

A) $(-\infty, -1] \cup [1, \infty)$

C) $(-\infty, -1] \cup (1, 4) \cup (4, \infty)$

B) $(-\infty, -1] \cup [1, 4]$

D) $(-\infty, -1) \cup (1, 4) \cup (4, \infty)$

Determine whether the given function is one-to-one. If it is one-to-one, find a formula for the inverse.

88) $f(x) = 8x + 3$

A) $f^{-1}(x) = \frac{x}{8} - 3$

B) Not one-to-one

C) $f^{-1}(x) = \frac{x + 3}{8}$

D) $f^{-1}(x) = \frac{x - 3}{8}$

$$89) f(x) = \frac{6}{x+5}$$

A) Not one-to-one

$$B) f^{-1}(x) = \frac{-5x+6}{x}$$

$$C) f^{-1}(x) = \frac{x}{5+6x}$$

$$D) f^{-1}(x) = \frac{5+6x}{x}$$

$$90) f(x) = \frac{-8x+4}{4x+6}$$

$$A) f^{-1}(x) = \frac{-8x+4}{4x+6}$$

$$B) f^{-1}(x) = \frac{-6x+4}{4x+8}$$

C) Not one-to-one

$$D) f^{-1}(x) = \frac{4x+8}{-6x+4}$$

Find the domain and range of the inverse of the given function.

$$91) f(x) = \frac{8}{x-9}$$

A) Domain: $(-\infty, 9) \cup (9, \infty)$

Range: $(-\infty, \infty)$

C) Domain: $(-\infty, 9) \cup (9, \infty)$

Range: $(-\infty, 0) \cup (0, \infty)$

B) Domain: $(-\infty, \infty)$

Range: $(-\infty, 9) \cup (9, \infty)$

D) Domain: $(-\infty, 0) \cup (0, \infty)$

Range: $(-\infty, 9) \cup (9, \infty)$

$$92) f(x) = \frac{2x+1}{x-5}$$

A) Domain: $(-\infty, 2) \cup (2, \infty)$

Range: $(-\infty, 5) \cup (5, \infty)$

C) Domain: $(-\infty, \infty)$

Range: $(-\infty, 5) \cup (5, \infty)$

B) Domain and range: $(-\infty, \infty)$

D) Domain: $(-\infty, 5) \cup (5, \infty)$

Range: $(-\infty, 2) \cup (2, \infty)$

Graph the function. Describe its position relative to the graph of the indicated basic function.

$$93) f(x) = 2^{x-1} - 2; \text{ relative to } f(x) = 2^x$$

A) Moved left 1 unit(s);
moved down 2 unit(s)

C) Moved right 1 unit(s);
moved down 2 unit(s)

B) Moved right 1 unit(s);
moved up 2 unit(s)

D) Moved left 1 unit(s);
moved up 2 unit(s)

$$94) f(x) = 3^{x+3} - 5; \text{ relative to } f(x) = 3^x$$

A) Moved left 3 unit(s);
moved up 5 unit(s)

C) Moved right 3 unit(s);
moved down 5 unit(s)

B) Moved right 3 unit(s);
moved up 5 unit(s)

D) Moved left 3 unit(s);
moved down 5 unit(s)

$$95) \text{ Let } f(x) = 3^{5x}. \text{ Evaluate } f(-4.1) \text{ and round to 3 decimal places.}$$

A) 1.656

B) 0.055

C) 0.011

D) 4.572

$$96) \text{ Let } f(x) = e^{3x}. \text{ Evaluate } f(-5.4) \text{ and round to 3 decimal places.}$$

A) 9.214

B) 1.371

C) 0.005

D) 20.086

Find the value of the expression.

97) $\log_{10} 1,000,000$

A) -6

B) 6,000,000

C) 6

D) 1,000,000

98) $\log_4 \frac{1}{16}$

A) -2

B) 4

C) 8

D) 1/2

Find the domain and the vertical asymptote of the function.

99) $f(x) = \log(x - 2)$

A) Domain $(1, \infty)$; vertical asymptote: $x = 1$

B) Domain $(0, \infty)$; vertical asymptote: $x = 0$

C) Domain $(2, \infty)$; vertical asymptote: $x = 2$

D) Domain $(-2, \infty)$; vertical asymptote: $x = -2$

100) $f(x) = \log(x + 4)$

A) Domain $(4, \infty)$; vertical asymptote: $x = 4$

B) Domain $(1, \infty)$; vertical asymptote: $x = 1$

C) Domain $(0, \infty)$; vertical asymptote: $x = 0$

D) Domain $(-4, \infty)$; vertical asymptote: $x = -4$

Find the following using a calculator. Round to four decimal places.

101) $\log 47$

A) 4.3501

B) 1.6721

C) 1.1721

D) 3.8501

102) $\ln 19$

A) 2.9444

B) 1.2788

C) 7.0111

D) 0.3386

103) Given the function $f(x) = 3^{x+4}$, which of the following is the equation for $f^{-1}(x)$?

A) $f^{-1}(x) = \log_3(x-4)$

B) $f^{-1}(x) = \log_3 x - 4$

C) $f^{-1}(x) = 3^{x-4}$

D) $\log_4(x+3)$

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

104) $\log_a 17 + \log_a 3$

A) $\log_a \frac{17}{3}$

B) $17 \log_a 3$

C) $\log_a 51$

D) $\log_a 17 \cdot \log_a 3$

105) $\frac{1}{2} \ln x - \ln 8$

A) $\ln \left(\frac{x}{2} - 8 \right)$

B) $\ln(\sqrt{x} - 8)$

C) $\ln \left(\frac{\sqrt{x}}{8} \right)$

D) $\ln \left(\sqrt{\frac{x}{8}} \right)$

106) $\frac{1}{2} \log_a x + 5 \log_a y - 2 \log_a x$

A) $\log_a x^4 y^5$

B) $\log_a x^2 y^5$

C) $\log_a \left(\frac{y^5}{x^{3/2}} \right)$

D) $\log_a \sqrt{x} y^5$

Solve the exponential equation.

107) $4^x = 11$

A) 2.750

B) 1.012

C) 0.578

D) 1.730

108) $3^{7x} = 3$

A) $\frac{1}{7}$

B) 1

C) 3

D) 7

109) $3^{10-2x} = 81$

A) 27

B) 3

C) 5

D) -3

Solve the logarithmic equation.

110) $\log_6 x = 3$

A) 729

B) 1,000,000

C) 18

D) 216

111) $\ln x = 2$

A) e^2

B) $\ln 2$

C) 100

D) $2e$

112) $\log_3(2x - 2) = 1$

A) $\frac{5}{3}$

B) 3

C) $\frac{5}{2}$

D) $\frac{\log_3 1 + 2}{2}$