

Chapter 2

1. State the domain and range of the relation.

$$\{(5, 8), (6, 9), (7, 10), (8, 11)\}$$

Ans: Domain = $\{5, 6, 7, 8\}$

Range = $\{8, 9, 10, 11\}$

Difficulty Level: Routine Section: 1

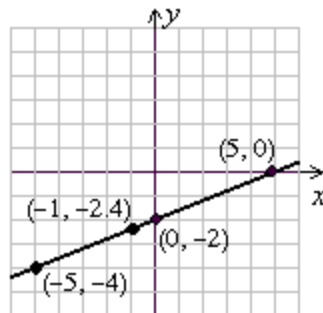
2. Complete the table using the given equation. Use these points to graph the relation.

$$y = \frac{2}{5}x - 2$$

x	y
5	
0	
-5	
-1	

Ans:

x	y
5	0
0	-2
-5	-4
-1	-2.4



Difficulty Level: Routine Section: 1

3. Complete the table using the given equation. If an x input corresponds to two possible y outputs, be sure to find both.

$$|y - 3| = x$$

x	y
0	
1	
2	
3	
4	
5	
6	
7	

Ans:

x	y
0	3
1	2, 4
2	1, 5
3	0, 6
4	-1, 7
5	-2, 8
6	-3, 9
7	-4, 10

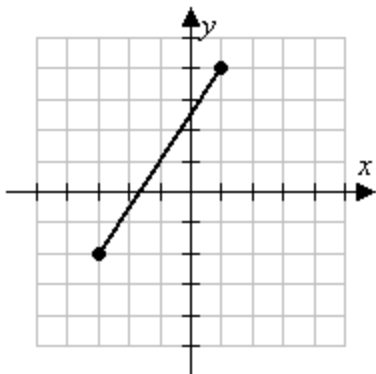
Difficulty Level: Moderate Section: 1

4. Find the midpoint of the segment with endpoints $(5, 7)$ and $(3, -5)$.

A) $(8, 2)$ B) $(2, 12)$ C) $(4, 1)$ D) $(1, 6)$

Ans: C Difficulty Level: Moderate Section: 1

5. Use the distance formula to find the length of the line segment.



(Gridlines are spaced one unit apart.)

A) 7 B) $2\sqrt{5}$ C) $2\sqrt{13}$ D) $\sqrt{10}$

Ans: C Difficulty Level: Difficult Section: 1

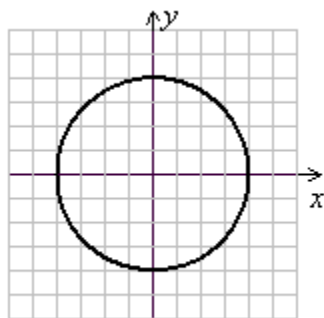
6. Find the equation of a circle with center $(0, 0)$ and radius 10.

Ans: $x^2 + y^2 = 100$

Difficulty Level: Routine Section: 1

7. Find the equation of a circle with center $(0, 0)$ and radius 4. Then sketch its graph.

Ans: $x^2 + y^2 = 16$

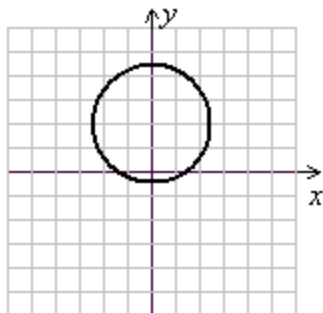


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Difficulty Level: Routine Section: 1

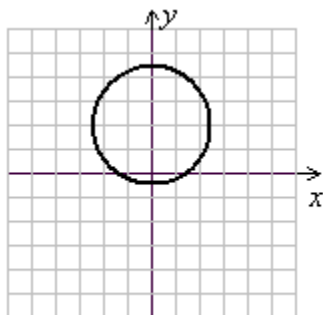
8. Find the equation of a circle with center $(0, 2)$ and radius $\sqrt{6}$. Then sketch its graph.

A) $x^2 + (y - 2)^2 = \sqrt{6}$



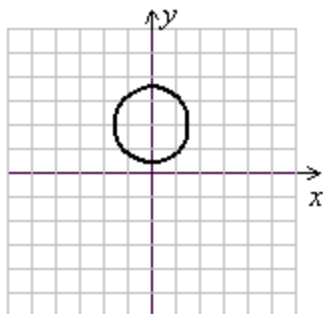
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B) $x^2 + (y - 2)^2 = 6$



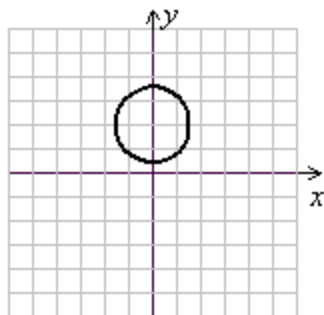
(Gridlines are spaced one unit apart.)

C) $x^2 + (y - 2)^2 = \sqrt{6}$



(Gridlines are spaced one unit apart.)

D) $x^2 + (y - 2)^2 = 6$



(Gridlines are spaced one unit apart.)

Ans: B Difficulty Level: Moderate Section: 1

9. Find the equation of a circle with center $(-7, 6)$ and radius $\sqrt{5}$.

A) $(x + 7)^2 + (y - 6)^2 = \sqrt{5}$

C) $(x + 7)^2 + (y - 6)^2 = 5$

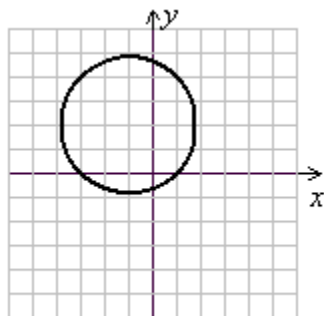
B) $(x - 7)^2 + (y + 6)^2 = \sqrt{5}$

D) $(x - 7)^2 + (y + 6)^2 = 5$

Ans: C Difficulty Level: Moderate Section: 1

10. Find the equation of a circle with center $(-1, 2)$ and radius $2\sqrt{2}$. Then sketch its graph.

Ans: $(x + 1)^2 + (y - 2)^2 = 8$

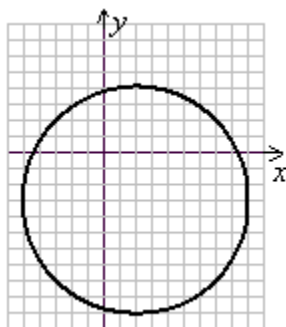


(Gridlines are spaced one unit apart.)

Difficulty Level: Moderate Section: 1

11. Find the equation of a circle with center $(2, -3)$ and the graph of which contains the point $(3, 4)$, then sketch its graph.

Ans: $(x - 2)^2 + (y + 3)^2 = 50$

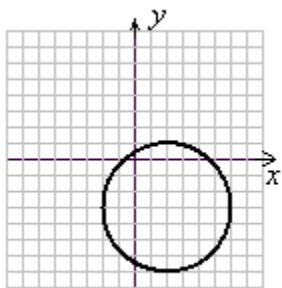


(Gridlines are spaced one unit apart.)

Difficulty Level: Difficult Section: 1

12. Find the equation of a circle whose diameter has endpoints $(2, -7)$ and $(2, 1)$, then sketch its graph.

Ans: $(x - 2)^2 + (y + 3)^2 = 16$



(Gridlines are spaced one unit apart.)

Difficulty Level: Difficult Section: 1

13. Identify the center and radius of the circle.

$(x + 6)^2 + (y - 4)^2 = 16$.

A) center $(-6, 4)$ and radius 4

C) center $(-6, 4)$ and radius 16

B) center $(6, -4)$ and radius 4

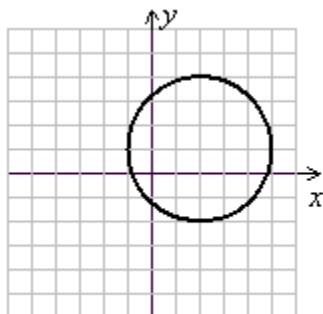
D) center $(6, -4)$ and radius 16

Ans: A Difficulty Level: Moderate Section: 1

14. Identify the center and radius of the circle, then graph. Also, state the domain and range of the relation.

$$(x - 2)^2 + (y - 1)^2 = 9$$

Ans: Center (2, 1), radius 3; $x \in [-1, 5]$, $y \in [-2, 4]$



(Gridlines are spaced one unit apart.)

Difficulty Level: Moderate Section: 1

15. Identify the center and radius of the circle.

$$x^2 + (y - 8)^2 = 4.$$

Ans: center (0, 8) and radius 2

Difficulty Level: Moderate Section: 1

16. Write the equation in factored form to find the center and radius of the circle.

$$x^2 + y^2 + 14x - 2y + 3 = 0$$

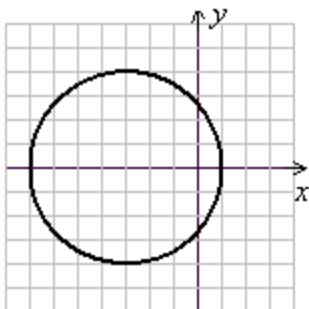
Ans: $(x + 7)^2 + (y - 1)^2 = 47$; center $(-7, 1)$, radius $\sqrt{47}$

Difficulty Level: Moderate Section: 1

17. Write the equation in factored form to find the center and radius of the circle. Then sketch the graph.

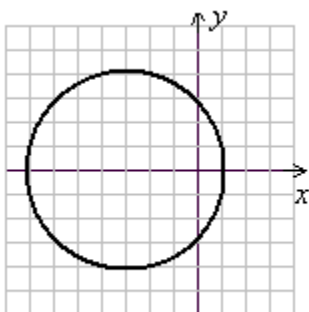
$$x^2 + y^2 + 6x - 8 = 0$$

A) $(x + 3)^2 + y^2 = 16$



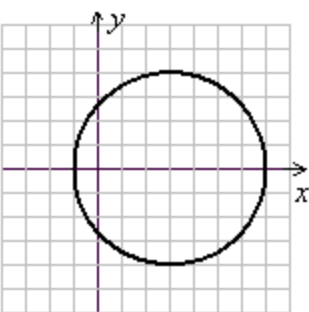
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B) $(x + 3)^2 + y^2 = 17$



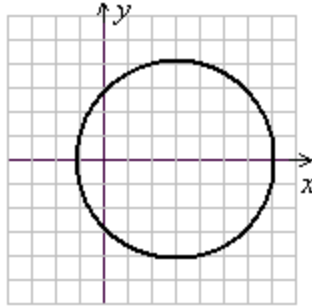
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C) $(x - 3)^2 + y^2 = 16$



(Gridlines are spaced one unit apart.)

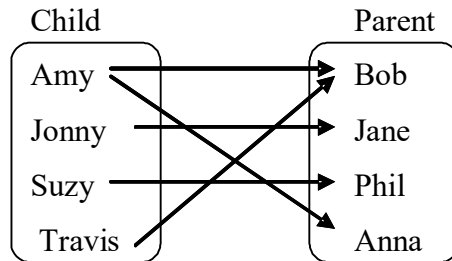
D) $(x - 3)^2 + y^2 = 17$



(Gridlines are spaced one unit apart.)

Ans: B Difficulty Level: Difficult Section: 1

18. Determine whether the mapping represents a function or nonfunction. If a nonfunction, explain how the definition of a function is violated.



- A) Function.
 B) Not a function. Amy is paired with two parents.
 C) Not a function. Two children are paired with Bob.
 D) Not a function. Some parents are paired with only one child.

Ans: B Difficulty Level: Routine Section: 2

19. Determine whether the relation represents a function or a nonfunction. If the relation is a nonfunction, explain how the definition of a function is violated.

$$\{(2, -5), (-1, -4), (4, -7), (1, -2), (-1, -6), (6, -8)\}$$

- A) Function B) Not a function; -1 is paired with -4 and -6 .

Ans: B Difficulty Level: Routine Section: 2

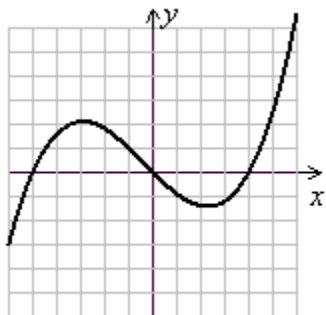
20. Determine whether the relation represents a function or a nonfunction. If the relation is a nonfunction, explain how the definition of a function is violated.

$$\{(-9, 10), (-12, 11), (-7, 8), (-10, 13), (-13, 11), (-5, 7)\}$$

- A) Function B) Nonfunction; -12 and -13 are both paired with 11 .

Ans: A Difficulty Level: Routine Section: 2

21. Determine whether the relation represents a function or nonfunction. If a nonfunction, explain how the definition of a function is violated.

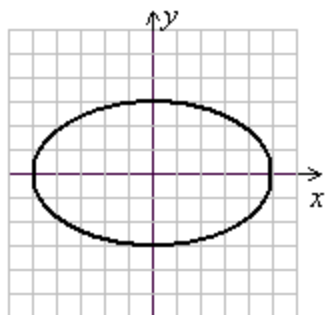


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Ans: Function

Difficulty Level: Routine Section: 2

22. Determine whether the relation represents a function or nonfunction. If a nonfunction, explain how the definition of a function is violated.

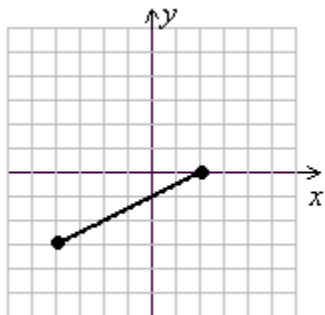


(Gridlines are spaced one unit apart.)

- A) Function
- B) Not a function; 5 and -5 are paired with 0.
- C) Not a function; 0 is paired with 3 and -3 .
- D) Not a function; 6 is not paired with anything.

Ans: C Difficulty Level: Routine Section: 2

23. Determine whether the relation represents a function or nonfunction, then determine the domain and range of the relation.



(Gridlines are spaced one unit apart.)

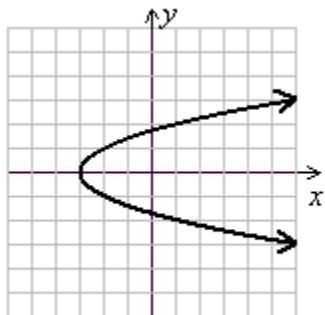
Ans: Function

$$x \in [-4, 2]$$

$$y \in [-3, 0]$$

Difficulty Level: Difficult Section: 2

24. Determine whether the relation represents a function or nonfunction, then determine the domain and range.



(Gridlines are spaced one unit apart.)

- A) **Function**
 $x \in [-3, \infty)$
 $y \in (-\infty, \infty)$
- B) **Not a function**
 $x \in [-3, \infty)$
 $y \in (-\infty, \infty)$
- C) **Function**
 $x \in (-\infty, \infty)$
 $y \in [-3, \infty)$
- D) **Not a function**
 $x \in (-\infty, \infty)$
 $y \in [-3, \infty)$

Ans: B Difficulty Level: Difficult Section: 2

25. Determine the domain of the function.

$$y = \frac{-6}{x-4}$$

Ans: $x \in (-\infty, 4) \cup (4, \infty)$

Difficulty Level: Routine Section: 2

26. Determine the domain of the function.

$$y = \sqrt{3x+4}$$

- A) $x \in \left(-\infty, -\frac{4}{3}\right) \cup \left(-\frac{4}{3}, \infty\right)$
- B) $x \in \left(-\infty, -\frac{4}{3}\right]$
- C) $x \in \left[-\frac{4}{3}, \infty\right)$
- D) $x \in \left[-\frac{4}{3}, \infty\right]$

Ans: D Difficulty Level: Routine Section: 2

27. Determine the domain of the function.

$$y = \frac{x-2}{x^2-9}$$

Ans: $x \in (-\infty, -3) \cup (-3, 3) \cup (3, \infty)$

Difficulty Level: Moderate Section: 2

28. Determine the value of $f(18)$ if $f(x) = -\frac{1}{6}x + 1$.

Ans: -2

Difficulty Level: Moderate Section: 2

29. Determine the value of $f(a+1)$ if $f(x) = -5x + 1$, then simplify as much as possible.

A) $-5a - 4$ B) $-5a + 2$ C) $a - 3$ D) $a - 4$

Ans: A Difficulty Level: Difficult Section: 2

30. Determine the value of $g(2a)$ if $g(x) = 4x + 1$.

Ans: $8a + 1$

Difficulty Level: Difficult Section: 2

31. Determine the value of $f(-6)$ if $f(x) = -x^2 - 4x$.

A) 30 B) -12 C) 36 D) -40

Ans: B Difficulty Level: Moderate Section: 2

Use the following to answer questions 32-35:

$$h(x) = \frac{4}{x}$$

32. Determine the value of $h(4)$.

Ans: 1

Difficulty Level: Moderate Section: 2

33. Determine the value of $h\left(-\frac{3}{4}\right)$.

A) -3 B) $-\frac{1}{3}$ C) $-\frac{16}{3}$ D) $-\frac{3}{16}$

Ans: C Difficulty Level: Moderate Section: 2

34. Determine the value of $h(4a)$.

A) a B) $\frac{1}{a}$ C) $16a$ D) $\frac{a}{16}$

Ans: B Difficulty Level: Moderate Section: 2

35. Determine the value of $h(a - 2)$.

Ans: $\frac{4}{a-2}$

Difficulty Level: Moderate Section: 2

Use the following to answer questions 36-39:

A car rental company charges a flat fee of \$21.50 and an hourly charge of \$14.50. This means that cost is a function of the hours the car is rented plus the flat fee.

36. Write this relationship in equation form.

Ans: $c(t) = 14.50t + 21.50$

Difficulty Level: Moderate Section: 2

37. Find the cost if the car is rented for 5.5 hr.

A) \$41.50 B) \$101.25 C) \$36.00 D) \$132.75

Ans: B Difficulty Level: Moderate Section: 2

38. Determine how long the car was rented if the bill came to \$152.00.

A) 9 hours B) 10 hours C) 11 hours D) 12 hours

Ans: A Difficulty Level: Moderate Section: 2

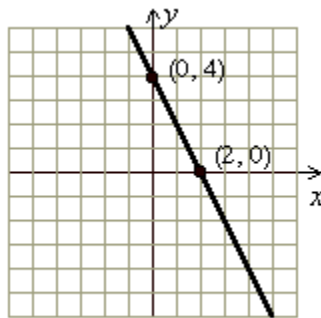
39. Determine the domain and range of the function in this context, if your budget limits you to paying a maximum of \$210 for the rental.

Ans: $t \in [0, 13], c \in [0, 210]$

Difficulty Level: Moderate Section: 2

40. Graph using the intercept method.

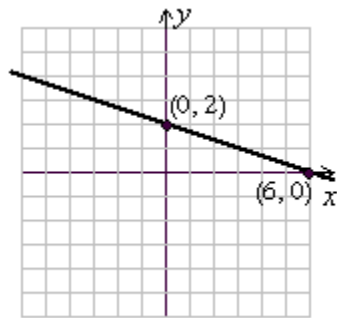
$2x + y = 4$



Ans:

Difficulty Level: Moderate Section: 3

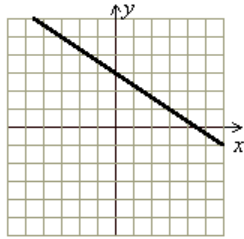
41. Graph using the intercept method.
 $x + 3y = 6$



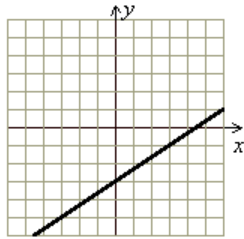
Ans:

Difficulty Level: Moderate Section: 3

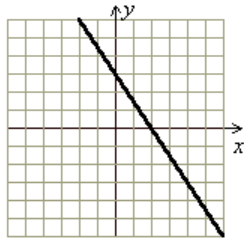
42. Graph by plotting points or using the intercept method.
 $3x + 2y = 6$



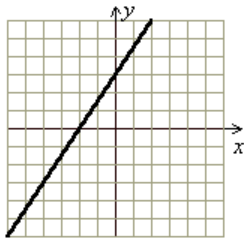
A)
 (Gridlines are spaced one unit apart.)



B)
 (Gridlines are spaced one unit apart.)



C)
 (Gridlines are spaced one unit apart.)

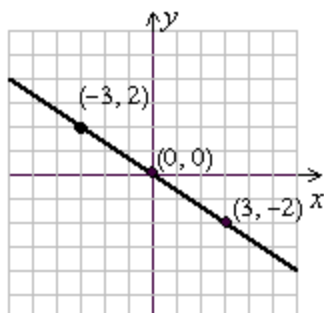


D)
 (Gridlines are spaced one unit apart.)

Ans: C Difficulty Level: Moderate Section: 3

43. Graph by plotting points or using the intercept method. Plot at least three points. Choose inputs that will help simplify the calculation.

$$y = -\frac{2}{3}x$$

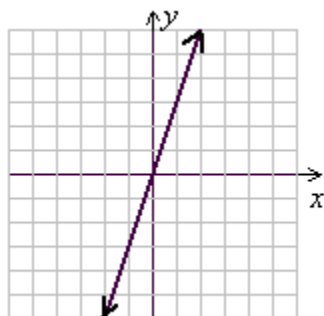


Ans:

Difficulty Level: Moderate Section: 3

44. Graph by plotting points or using the intercept method.

$$y - 3x = 0$$



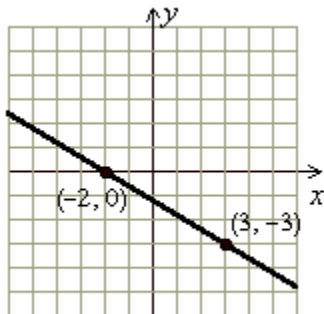
Ans:

(Gridlines are spaced one unit apart.)

Difficulty Level: Moderate Section: 3

45. Graph by plotting points or using the intercept method. Choose inputs that will help simplify the calculation.

$$3x + 5y = -6$$



Ans:

Difficulty Level: Moderate Section: 3

46. Compute the slope of the line through the points (6, 17) and (1, 7).

Ans: 2

Difficulty Level: Routine Section: 3

47. Compute the slope of the line through the points (4, 4) and (−4, −7).

A) $-\frac{8}{11}$ B) $\frac{8}{11}$ C) $-\frac{11}{8}$ D) $\frac{11}{8}$

Ans: D Difficulty Level: Moderate Section: 3

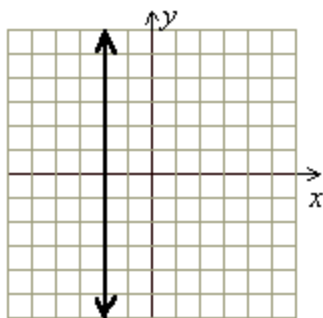
48. Compute the slope of the line through the points (−5, −1) and (−1, −5).

Ans: −1

Difficulty Level: Moderate Section: 3

49. Graph by plotting points or using the intercept method.

$$x = -2$$



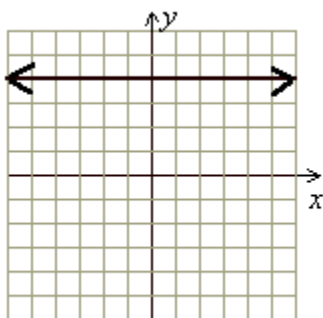
Ans:

(Gridlines are spaced one unit apart.)

Difficulty Level: Routine Section: 3

50. Graph by plotting points or using the intercept method.

$$y = 4$$



Ans:

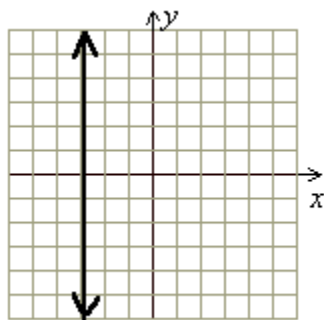
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Difficulty Level: Routine Section: 3

51. Graph by plotting points or using the intercept method.

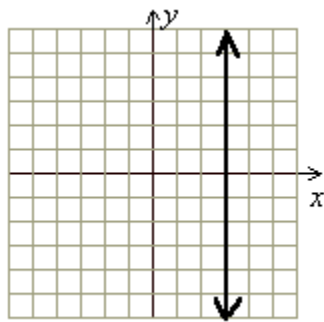
$$x = 3$$

A)



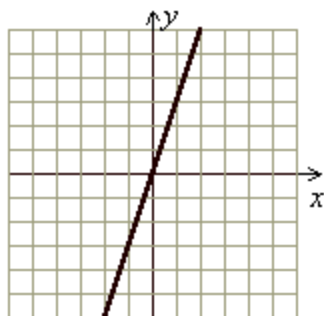
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B)



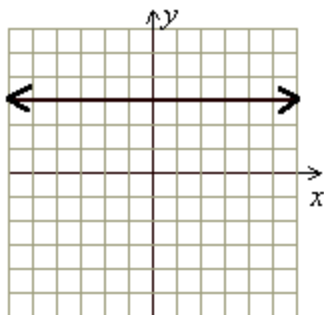
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C)



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D)

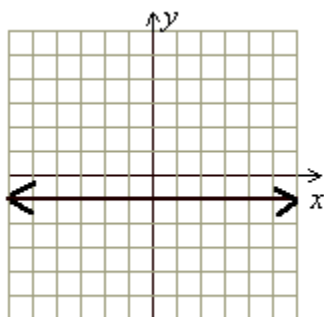


(Gridlines are spaced one unit apart.)

Ans: B Difficulty Level: Routine Section: 3

52. Graph by plotting points or using the intercept method.

$$y = -1$$



Ans:

(Gridlines are spaced one unit apart.)

Difficulty Level: Routine Section: 3

53. Two points on L_1 and two points on L_2 are given. Use the slope formula to determine if lines L_1 and L_2 are parallel, perpendicular, or neither.

L_1 : $(-4, -7)$ and $(1, 3)$

L_2 : $(2, 6)$ and $(5, 12)$

A) Parallel B) Perpendicular C) Neither

Ans: A Difficulty Level: Difficult Section: 3

54. Two points on L_1 and two points on L_2 are given. Use the slope formula to determine if lines L_1 and L_2 are parallel, perpendicular, or neither.

L_1 : $(9, 2)$ and $(3, -8)$

L_2 : $(5, 5)$ and $(-5, -1)$

A) Parallel B) Perpendicular C) Neither

Ans: C Difficulty Level: Difficult Section: 3

55. Two points on L_1 and two points on L_2 are given. Use the slope formula to determine if lines L_1 and L_2 are parallel, perpendicular, or neither.

L_1 : (2, 0) and (6, 2)

L_2 : (6, -5) and (8, -9)

A) Parallel B) Perpendicular C) Neither

Ans: B Difficulty Level: Difficult Section: 3

56. Two points on L_1 and two points on L_2 are given. Use the slope formula to determine if lines L_1 and L_2 are parallel, perpendicular, or neither.

L_1 : (3, 4) and (7, 11)

L_2 : (9, -9) and (5, -16)

A) Parallel B) Perpendicular C) Neither

Ans: A Difficulty Level: Difficult Section: 3

Use the following to answer questions 57-58:

A business purchases a copier for \$9500 and anticipates it will depreciate in value \$850 per year.

57. What is the copier's value after 2 years of use?

A) \$5150 B) \$5200 C) \$5250 D) \$5300

Ans: B Difficulty Level: Moderate Section: 3

58. How many years will it take for the copier's value to decrease to \$4350?

Ans: 3 years

Difficulty Level: Moderate Section: 3

59. Write the equation in function form and identify the new coefficient of x and the new constant term.

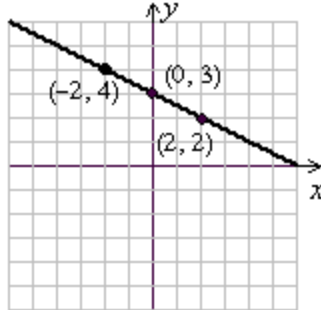
$$5y + 6x = -40$$

Ans: $f(x) = -\frac{6}{5}x - 8$; new coeff: $-\frac{6}{5}$; new constant: -8

Difficulty Level: Moderate Section: 4

60. Evaluate the function by selecting three inputs that will result in integer values. Then graph the line.

$$y = -\frac{1}{2}x + 3$$



Ans:

Difficulty Level: Moderate Section: 4

Use the following to answer questions 61-62:

$$4x - 10y = 20$$

61. Write the equation in the slope-intercept form.

A) $y = -\frac{2}{5}x + 20$ B) $y = \frac{2}{5}x - 20$ C) $y = \frac{2}{5}x - 2$ D) $y = -\frac{2}{5}x + 2$

Ans: C Difficulty Level: Routine Section: 4

62. Identify the slope and y-intercept.

Ans: slope = $\frac{2}{5}$; y-intercept (0, -2)

Difficulty Level: Routine Section: 4

63. Write the equation in slope-intercept form, then identify the slope and y-intercept.

$$y + 6x = 1$$

Ans: $y = -6x + 1$; slope: -6; y-intercept: (0, 1)

Difficulty Level: Routine Section: 4

64. Use the slope-intercept formula to find the equation of the line with slope 5 and y-intercept (0, 3).

A) $y = 3x + 5$ B) $3x + 5y = 0$ C) $y = 5x + 3$ D) $5y = 3$

Ans: C Difficulty Level: Routine Section: 4

65. Use the slope-intercept formula to find the equation of the line with slope with a slope of -4 if the point (4, -9) is on the line.

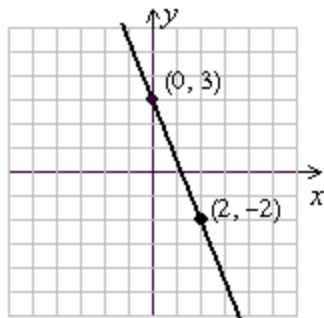
Ans: $y = -4x + 7$

Difficulty Level: Moderate Section: 4

66. Write the equation in slope-intercept form, then use the slope and intercept to graph the line.

$$5x + 2y = 6$$

Ans: $y = -\frac{5}{2}x + 3$

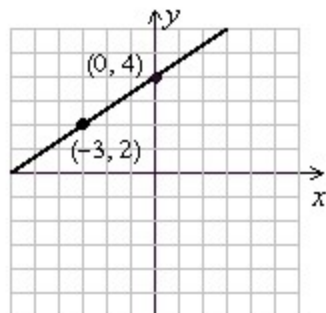


Difficulty Level: Moderate Section: 4

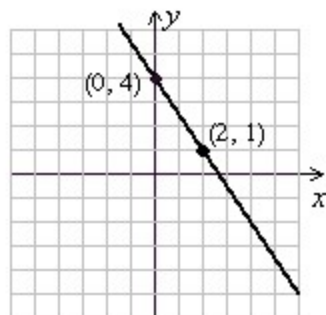
67. Graph the linear equation using the y -intercept and the slope indicated.

$$y = -\frac{2}{3}x + 4$$

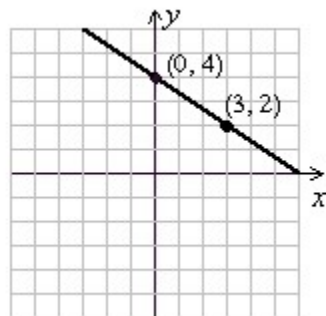
A)



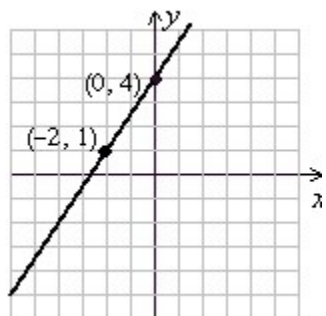
B)



C)

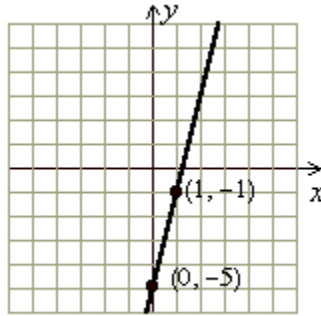


D)



Ans: C Difficulty Level: Moderate Section: 4

68. Graph the linear equation using the y -intercept and the slope indicated.
 $y = 4x - 5$



Ans:

Difficulty Level: Moderate Section: 4

69. Find the equation of the line which is parallel to $-5x + 2y = 12$ and through the point $(10, 21)$. Write answer in slope-intercept form.

A) $y = \frac{5}{2}x - 4$ B) $y = \frac{5}{2}x + 4$ C) $y = \frac{2}{5}x + 17$ D) $y = -\frac{2}{5}x + 25$

Ans: A Difficulty Level: Difficult Section: 4

70. Find the equation of the line perpendicular to $x - 7y = 28$ and through the point $(1, -12)$. Write the answer in slope-intercept form.

Ans: $y = -7x - 5$

Difficulty Level: Difficult Section: 4

71. Write the lines in slope-intercept form and state whether they are parallel, perpendicular, or neither.

$$5y - 3x = 3$$

$$3y + 5x = 4$$

A) Parallel B) Perpendicular C) Neither

Ans: B Difficulty Level: Difficult Section: 4

72. Write the lines in slope-intercept form and state whether they are parallel, perpendicular, or neither.

$$7y - 4x = -7$$

$$-4x + 7y = 16$$

A) Parallel B) Perpendicular C) Neither

Ans: A Difficulty Level: Difficult Section: 4

73. Write the lines in slope-intercept form and state whether they are parallel, perpendicular, or neither.

$$-8x + 6y = -1$$

$$4x + 3y = 11$$

A) Parallel B) Perpendicular C) Neither

Ans: C Difficulty Level: Difficult Section: 4

74. Find the equation of the line in point-slope form, then write the equation in function form.

$$m = 2; P_1 = (-7, -9)$$

$$\text{Ans: } y + 9 = 2(x + 7); f(x) = 2x + 5$$

Difficulty Level: Moderate Section: 4

Use the following to answer questions 75-77:

A line has slope $m = \frac{2}{5}$ and passes through the point $P_1 = (2, -4)$.

75. Find the equation of the line in point-slope form.

A) $y + 4 = \frac{2}{5}(x + 2)$

C) $y + 4 = \frac{2}{5}(x - 2)$

B) $y - 4 = \frac{2}{5}(x + 2)$

D) $y - 4 = \frac{2}{5}(x - 2)$

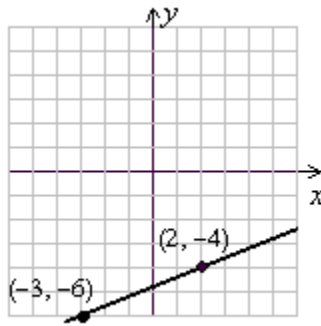
Ans: C Difficulty Level: Routine Section: 4

76. Write the equation in function form.

A) $y = \frac{2}{5}x - \frac{24}{5}$ B) $y = \frac{2}{5}x + \frac{24}{5}$ C) $y = \frac{2}{5}x - \frac{16}{5}$ D) $y = \frac{2}{5}x + \frac{16}{5}$

Ans: A Difficulty Level: Moderate Section: 4

77. Graph the line.



Ans:

Difficulty Level: Difficult Section: 4

Use the following to answer questions 78-80:

A driver going down a straight highway is traveling at 70 ft/sec on cruise control when he begins accelerating at a rate of 4.2 ft/sec^2 . The final velocity of the car is given by the function

$$V(t) = \frac{21}{5}t + 70, \text{ where } V(t) \text{ is the velocity at time } t.$$

78. Interpret the meaning of the slope and y-intercept in this context.

Ans: Every 5 seconds the velocity is increasing by 21 ft/sec. The initial velocity is 70 ft/sec.

Difficulty Level: Difficult Section: 4

79. Determine the velocity of the car after 10.4 seconds.

A) 111.40 ft/sec B) 112.32 ft/sec C) 113.68 ft/sec D) 114.54 ft/sec

Ans: C Difficulty Level: Routine Section: 4

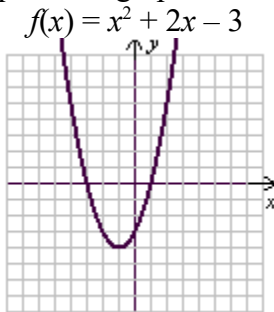
80. If the car is traveling at 100 ft/sec, for how long did it accelerate? (Round to the nearest tenth of a second.)

A) 6.9 seconds B) 7.1 seconds C) 7.3 seconds D) 7.5 seconds

Ans: B Difficulty Level: Moderate Section: 4

Use the following to answer questions 81-86:

A quadratic graph is shown. Assume required features have integer values.



(Gridlines are spaced one unit apart.)

81. Describe the end behavior.

A) up/up B) down/down C) up/down D) down/up

Ans: A Difficulty Level: Routine Section: 5

82. Identify the vertex.

A) (4, 1) B) (-4, -1) C) (1, 4) D) (-1, -4)

Ans: D Difficulty Level: Routine Section: 5

83. Identify the axis of symmetry.

A) $x = 1$ B) $x = -1$ C) $x = 4$ D) $x = -4$

Ans: B Difficulty Level: Routine Section: 5

84. Identify the x- and y-intercepts.

Ans: x-intercepts: (-3, 0), (1, 0); y-intercept: (0, -3)

Difficulty Level: Routine Section: 5

85. Determine the domain.

- A) $x \in [-3, 1]$ B) $x \in (-4, \infty)$ C) $x \in [-4, \infty)$ D) $x \in (-\infty, \infty)$

Ans: D Difficulty Level: Routine Section: 5

86. Determine the range.

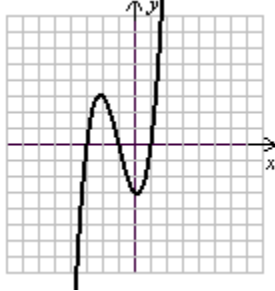
- A) $y \in [-3, 1]$ B) $y \in (-4, \infty)$ C) $y \in [-4, \infty)$ D) $y \in (-\infty, \infty)$

Ans: C Difficulty Level: Routine Section: 5

Use the following to answer questions 87-90:

A cubic graph is shown. Assume required features have integer values.

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



(Gridlines are spaced one unit apart.)

87. Describe the end behavior.

- A) up on left, up on right C) down on left, up on right
B) up on left, down on right D) down on left, down on right

Ans: C Difficulty Level: Difficult Section: 5

88. Identify the x - and y -intercepts.

- A) $(0, 1), (0, -1), (0, 3), (-3, 0)$ C) $(1, 0), (-1, 0), (3, 0), (0, -3)$
B) $(0, 1), (0, -1), (0, -3), (-3, 0)$ D) $(1, 0), (-1, 0), (-3, 0), (0, -3)$

Ans: D Difficulty Level: Difficult Section: 5

89. Determine the domain and range.

Ans: $x \in (-\infty, \infty); y \in (-\infty, \infty)$

Difficulty Level: Moderate Section: 5

90. Give the location of the point of inflection.

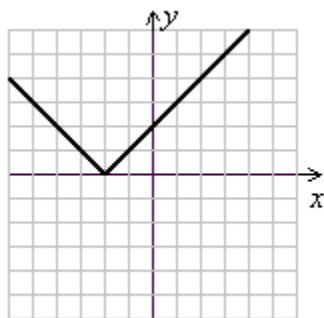
- A) $(0, -3)$ B) $(-3, 3)$ C) $(-1, 0)$ D) $(1, -1)$

Ans: C Difficulty Level: Moderate Section: 5

91. Sketch the graph using transformations of a parent function (without a table of values).

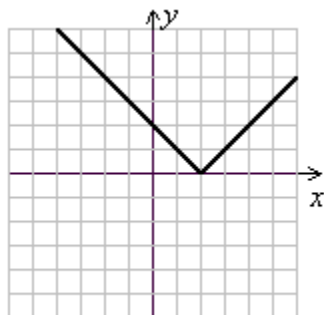
$$f(x) = |x| - 2$$

A)



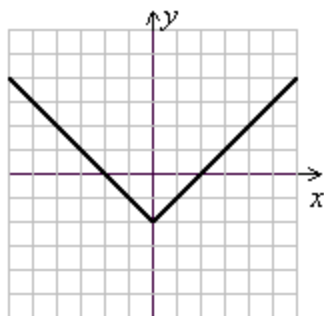
(Gridlines are spaced one unit apart.)

B)



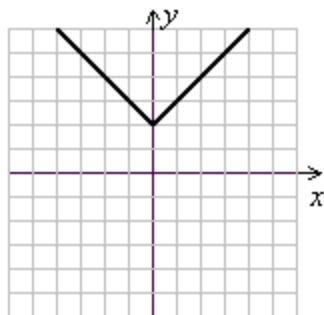
(Gridlines are spaced one unit apart.)

C)



(Gridlines are spaced one unit apart.)

D)

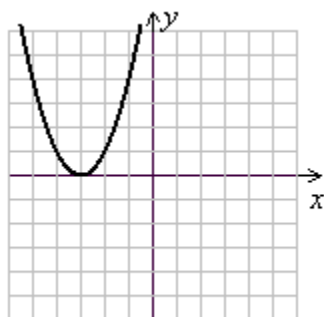


(Gridlines are spaced one unit apart.)

Ans: C Difficulty Level: Moderate Section: 5

92. Sketch the graph using transformations of a parent function (without a table of values).

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



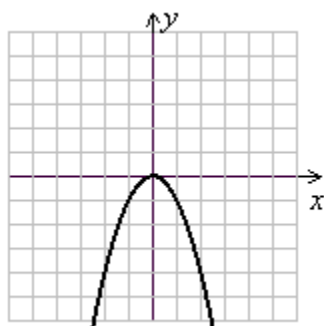
Ans:

(Gridlines are spaced one unit apart.)

Difficulty Level: Moderate Section: 5

93. Sketch the graph using transformations of a parent function (without a table of values).

$$f(x) = -x^2$$



Ans:

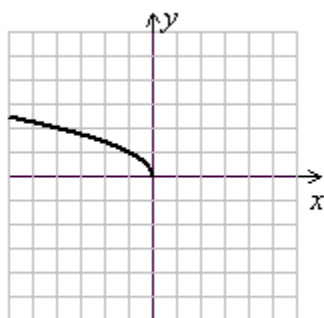
(Gridlines are spaced one unit apart.)

Difficulty Level: Moderate Section: 5

94. Sketch the graph using transformations of a parent function (without a table of values).

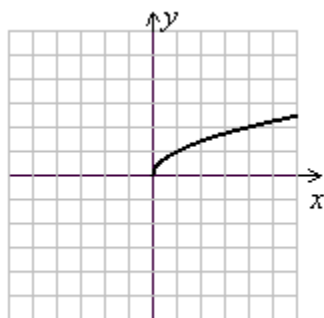
$$f(x) = \sqrt{-x}$$

A)



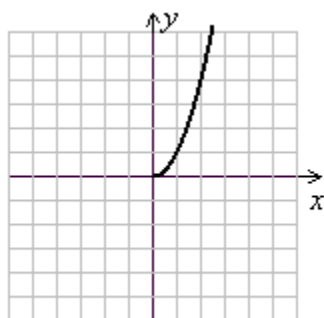
(Gridlines are spaced one unit apart.)

B)



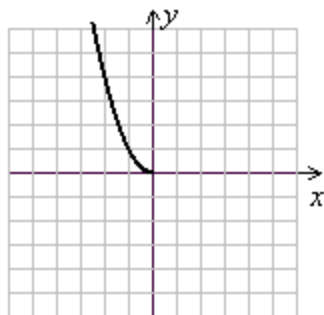
(Gridlines are spaced one unit apart.)

C)



(Gridlines are spaced one unit apart.)

D)

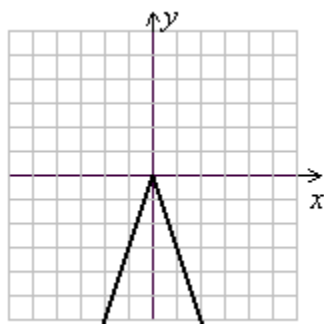


(Gridlines are spaced one unit apart.)

Ans: A Difficulty Level: Moderate Section: 5

95. Sketch the graph using transformations of a parent function (without a table of values).

$$f(x) = -3|x|$$



Ans:

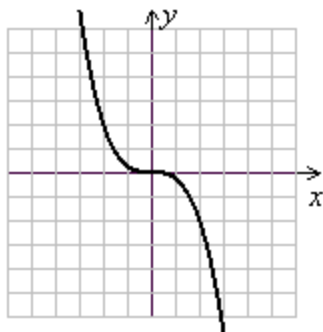
(Gridlines are spaced one unit apart.)

Difficulty Level: Moderate Section: 5

96. Sketch the graph using transformations of a parent function (without a table of values).

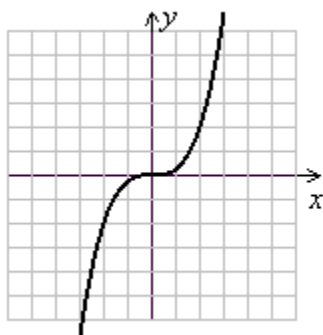
$$f(x) = \frac{1}{4}x^3$$

A)



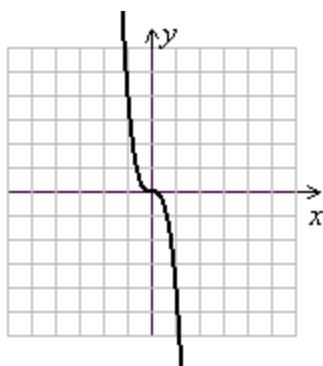
(Gridlines are spaced one unit apart.)

B)



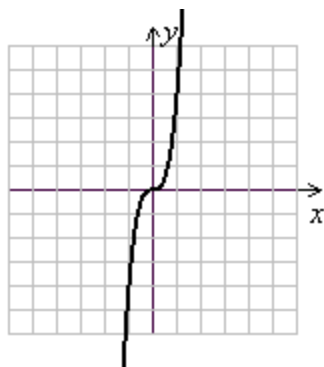
(Gridlines are spaced one unit apart.)

C)



(Gridlines are spaced one unit apart.)

D)



(Gridlines are spaced one unit apart.)

Ans: B Difficulty Level: Moderate Section: 5

97. Match each equation (a-f) to its graph (I-VI).

a. $f(x) = \sqrt{x-1} + 2$

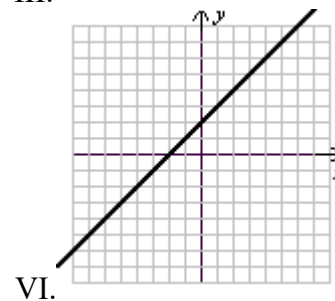
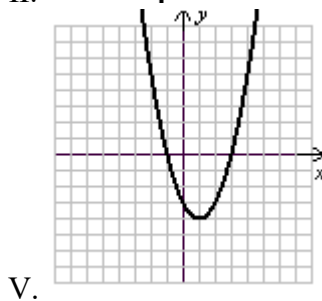
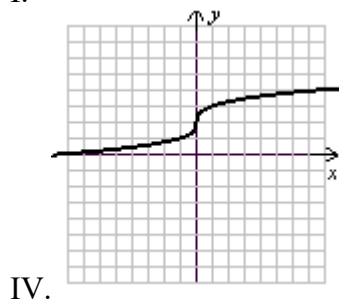
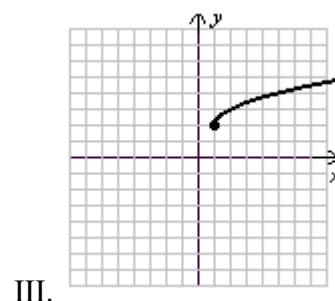
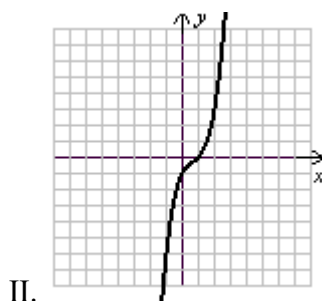
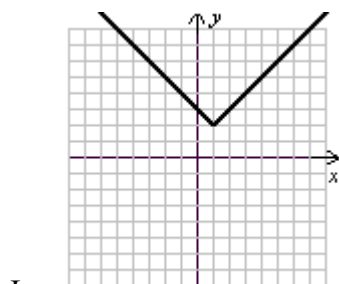
b. $g(x) = (x-1)^2 - 4$

c. $q(x) = |x-1| + 2$

d. $r(x) = x + 2$

e. $h(x) = x^3 - 2x^2 + 2x - 1$

f. $s(x) = \sqrt[3]{x} + 2$



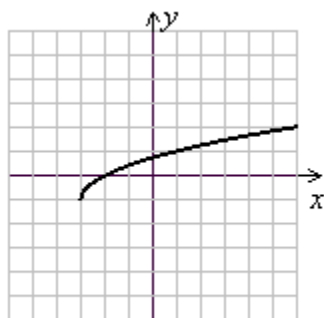
(Gridlines on each graph are spaced one unit apart.)

Ans: a. III b. V c. I d. VI e. II f. IV

Difficulty Level: Difficult Section: 5

98. Sketch the graph using shifts of a parent function and a few characteristic points.

$$f(x) = \sqrt{x+3} - 1$$



Ans:

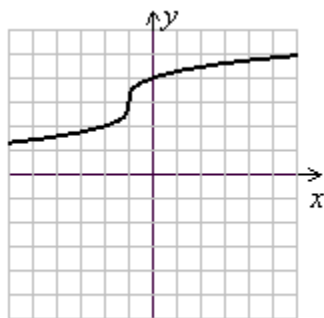
(Gridlines are spaced one unit apart.)

Difficulty Level: Moderate Section: 5

99. Sketch the graph using shifts of a parent function and a few characteristic points.

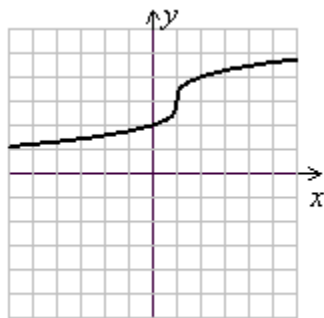
$$f(x) = \sqrt[3]{x+1} - 3$$

A)



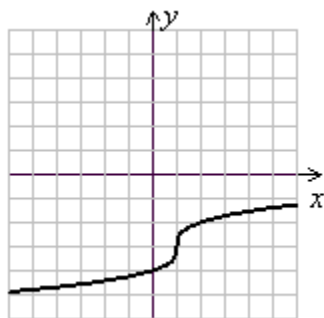
(Gridlines are spaced one unit apart.)

B)



(Gridlines are spaced one unit apart.)

C)



(Gridlines are spaced one unit apart.)

D)

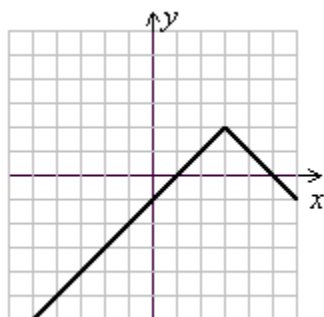


(Gridlines are spaced one unit apart.)

Ans: D Difficulty Level: Moderate Section: 5

100. Sketch the graph using shifts of a parent function and a few characteristic points.

$$f(x) = -|x - 3| + 2$$



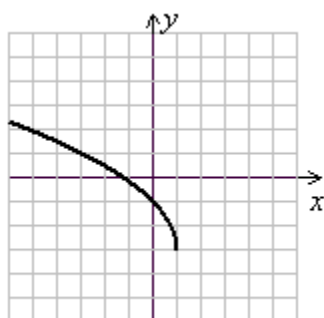
Ans:

(Gridlines are spaced one unit apart.)

Difficulty Level: Difficult Section: 5

101. Sketch the graph using shifts of a parent function and a few characteristic points.

$$f(x) = 2\sqrt{-x + 1} - 3$$



Ans:

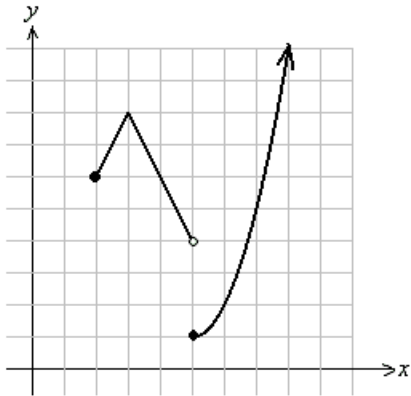
(Gridlines are spaced one unit apart.)

Difficulty Level: Difficult Section: 5

Use the following to answer questions 102-103:

$$Y_1 = -2|x - 3| + 8$$

$$Y_2 = (x - 5)^2 + 1$$



(Gridlines are spaced one unit apart.)

102. Use the correct notation to write the functions as a single piecewise-defined function. State the effective domain for each piece by inspecting the graph.

A) $f(x) = \begin{cases} -2|x-3|+8 & 2 \leq x \leq 5 \\ (x-5)^2+1 & x \geq 5 \end{cases}$

C) $f(x) = \begin{cases} -2|x-3|+8 & 2 \leq x < 5 \\ (x-5)^2+1 & x > 5 \end{cases}$

B) $f(x) = \begin{cases} -2|x-3|+8 & 2 \leq x \leq 5 \\ (x-5)^2+1 & x > 5 \end{cases}$

D) $f(x) = \begin{cases} -2|x-3|+8 & 2 \leq x < 5 \\ (x-5)^2+1 & x \geq 5 \end{cases}$

Ans: D Difficulty Level: Moderate Section: 6

103. State the range of the function

A) $y \in (1, \infty)$

C) $y \in [1, 4) \cup (4, 6]$

B) $y \in [1, \infty)$

D) $y \in [1, 4) \cup (4, \infty)$

Ans: B Difficulty Level: Moderate Section: 6

Use the following to answer questions 104-108:

$$f(x) = \begin{cases} 9 & x \leq -2 \\ |x+1| & -2 < x \leq 2 \\ -3 & x > 2 \end{cases}$$

104. Evaluate $f(-12)$.

A) -12 B) 9 C) 11 D) -3

Ans: B Difficulty Level: Moderate Section: 6

105. Evaluate $f(-1)$.

A) -1 B) 8 C) 0 D) -3

Ans: B Difficulty Level: Moderate Section: 6

106. Evaluate $f(2)$.

A) 2 B) 10 C) 3 D) -3

Ans: C Difficulty Level: Moderate Section: 6

107. Evaluate $f(5)$.

A) 5 B) 10 C) 6 D) -3

Ans: C Difficulty Level: Moderate Section: 6

108. Evaluate $f(7)$.

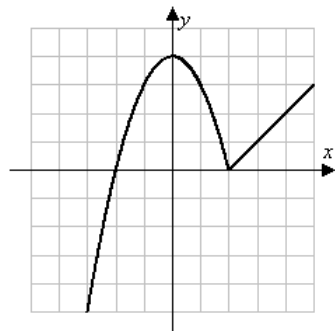
A) 7 B) 9 C) 8 D) -2

Ans: D Difficulty Level: Moderate Section: 6

109. Graph the piecewise-defined function and state its domain and range. Use transformations of the toolbox functions where possible.

$$f(x) = \begin{cases} 4 - x^2 & x \leq 2 \\ x - 2 & x > 2 \end{cases}$$

Ans: $x \in (-\infty, \infty)$; $y \in (-\infty, \infty)$



(Gridlines are spaced one unit apart.)

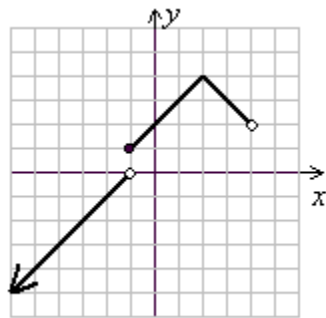
Difficulty Level: Difficult Section: 6

Use the following to answer questions 110-112:

$$f(x) = \begin{cases} -x - 1 & x < -1 \\ -|x - 2| + 4 & -1 \leq x < 4 \end{cases}$$

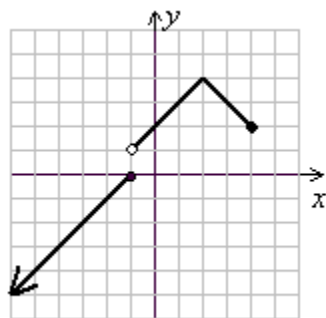
110. Graph the piecewise-defined function.

A)



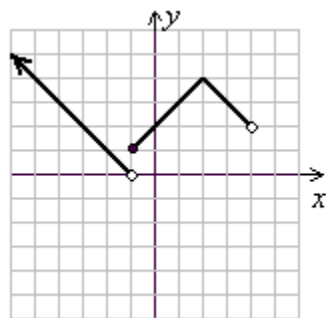
(Gridlines are spaced one unit apart.)

B)



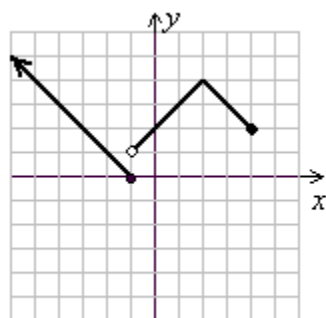
(Gridlines are spaced one unit apart.)

C)



(Gridlines are spaced one unit apart.)

D)



(Gridlines are spaced one unit apart.)

Ans: C Difficulty Level: Difficult Section: 6

111. State the domain of the function.

A) $(0, \infty)$ B) $(-\infty, 4)$ C) $(-\infty, -1) \cup (-1, 4)$ D) $(-\infty, 0] \cup (1, \infty)$

Ans: B Difficulty Level: Difficult Section: 6

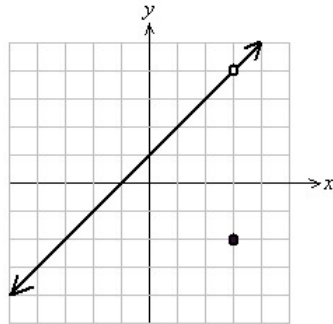
112. State the range of the function.

A) $(0, \infty)$ B) $[0, \infty)$ C) $(-\infty, 0) \cup [1, \infty)$ D) $(-\infty, 0] \cup (1, \infty)$

Ans: A Difficulty Level: Difficult Section: 6

113. Use a table of values as needed to graph the function, then state its domain and range. If the function has a pointwise discontinuity, state how the second piece could be redefined so that a continuous function results.

$$f(x) = \begin{cases} \frac{x^2 - 2x - 3}{x - 3} & x \neq 3 \\ -2 & x = 3 \end{cases}$$

Ans: $x \in (-\infty, \infty); y \in (-\infty, \infty)$ 

(Gridlines are spaced one unit apart.)

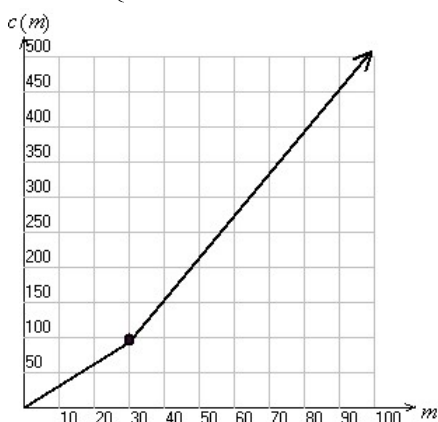
If the second piece is redefined as 4, a continuous function results.

Difficulty Level: Difficult Section: 6

114. A phone service charges 3.1 cents per minute for the first 30 minutes and 6 cents per minute thereafter.

- (a) Write this information in the form of a simplified piecewise-defined function and state the effective domain for each piece.
 (b) Sketch the graph.
 (c) Find the cost of a 48-minute phone call.

Ans: (a) $c(m) = \begin{cases} 3.1m & m \leq 30 \\ 6m - 87 & m > 30 \end{cases}$



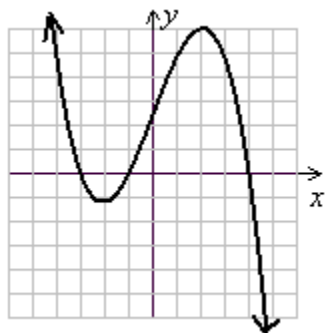
(b)

(c) 201 cents or \$2.01

Difficulty Level: Difficult Section: 6

115. Use the graph given to solve the inequality indicated. Write the answer in interval notation.

$$p(x) > 0$$



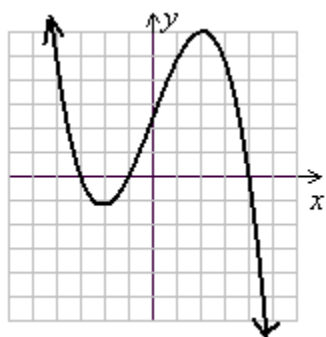
(Gridlines are spaced one unit apart.)

Ans: $x \in (-\infty, -3) \cup (-1, 4)$

Difficulty Level: Moderate Section: 7

116. Use the graph given to solve the inequality indicated. Write the answer in interval notation.

$$p(x) < 0$$



(Gridlines are spaced one unit apart.)

A) $x \in (-\infty, -3) \cup (-1, 4)$

C) $x \in (-\infty, -1) \cup (4, \infty)$

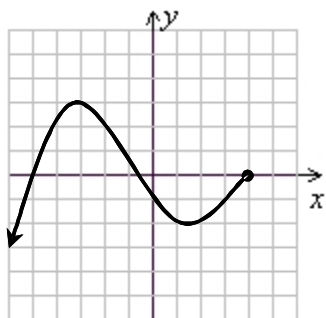
B) $x \in (-3, -1) \cup (4, \infty)$

D) $x \in (-\infty, -3) \cup (-1, \infty)$

Ans: B Difficulty Level: Moderate Section: 7

117. Use vertical and horizontal boundary lines to help state the domain and range of the function given.

$$y = f(x)$$



(Gridlines are spaced one unit apart.)

A) $x \in [-5, 4], y \in (-\infty, 3]$

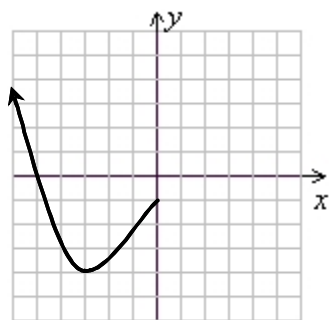
C) $x \in (-\infty, 4], y \in (-\infty, 3]$

B) $x \in [-5, 4], y \in [-2, 3]$

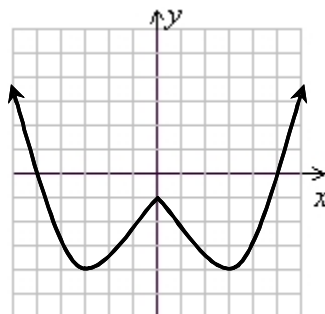
D) $x \in (-\infty, 4], y \in [-2, 3]$

Ans: C Difficulty Level: Routine Section: 7

118. The following function is known to be even. Complete the graph using symmetry.



(Gridlines are spaced one unit apart.)



Ans:

(Gridlines are spaced one unit apart.)

Difficulty Level: Difficult Section: 7

119. Determine whether the function is even using $x = k$.

$$f(x) = 7|x| + 9x^2 + 1$$

A) even B) not even

Ans: A Difficulty Level: Moderate Section: 7

120. Determine whether the function is even using $x = k$.

$$f(x) = 5|x| + 7x - 5$$

A) even B) not even

Ans: B Difficulty Level: Moderate Section: 7

121. Determine whether the function is even using $x = k$.

$$f(x) = -6x^4 + 9x^3 - 7$$

A) even B) not even

Ans: B Difficulty Level: Moderate Section: 7

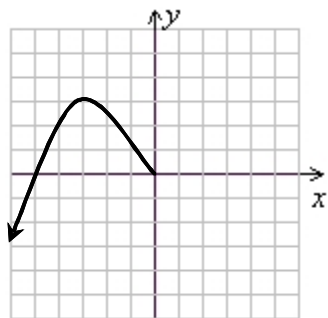
122. Determine whether the function is even using $x = k$.

$$f(x) = -7x^4 - 5x^2 + 3$$

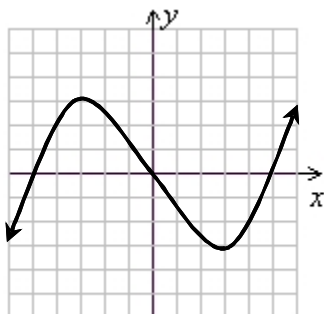
A) even B) not even

Ans: A Difficulty Level: Moderate Section: 7

123. The following function is known to be odd. Complete the graph using symmetry.



(Gridlines are spaced one unit apart.)



Ans:

(Gridlines are spaced one unit apart.)

Difficulty Level: Difficult Section: 7

124. Determine whether the function is odd using $x = k$.

$$f(x) = \sqrt[3]{x} + 8x^3$$

A) odd B) not odd

Ans: A Difficulty Level: Moderate Section: 7

125. Determine whether the function is odd using $x = k$.

$$f(x) = \sqrt[3]{x} - 9x^2$$

A) odd B) not odd

Ans: B Difficulty Level: Moderate Section: 7

126. Determine whether the function is odd using $x = k$.

$$f(x) = 6x^3 - 10x^2 - 8$$

A) odd B) not odd

Ans: B Difficulty Level: Moderate Section: 7

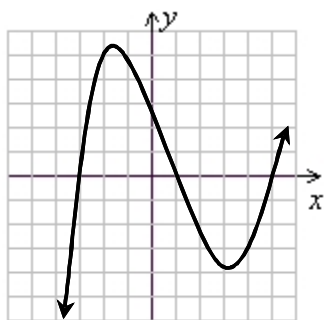
127. Determine whether the function is odd using $x = k$.

$$f(x) = -9x^3 + 2x$$

A) odd B) not odd

Ans: A Difficulty Level: Moderate Section: 7

128. Use the graph to solve the inequality $f(x) > 0$. Write the answer in interval notation.



(Gridlines are spaced one unit apart.)

A) $x \in (-\infty, -3) \cup (1, 5)$

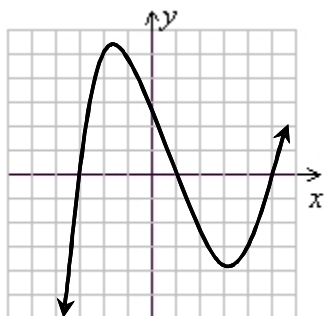
C) $x \in (-3, 1) \cup (5, \infty)$

B) $x \in (-\infty, -3] \cup [1, 5]$

D) $x \in [-3, 1] \cup [5, \infty)$

Ans: C Difficulty Level: Moderate Section: 7

129. Use the graph to solve the inequality $f(x) \geq 0$. Write the answer in interval notation.



(Gridlines are spaced one unit apart.)

A) $x \in (-\infty, -3) \cup (1, 5)$

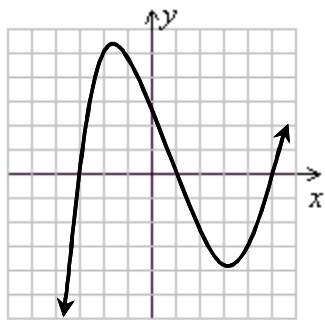
C) $x \in (-3, 1) \cup (5, \infty)$

B) $x \in (-\infty, -3] \cup [1, 5]$

D) $x \in [-3, 1] \cup [5, \infty)$

Ans: D Difficulty Level: Moderate Section: 7

130. Use the graph to solve the inequality $f(x) < 0$. Write the answer in interval notation.



(Gridlines are spaced one unit apart.)

A) $x \in (-\infty, -3) \cup (1, 5)$

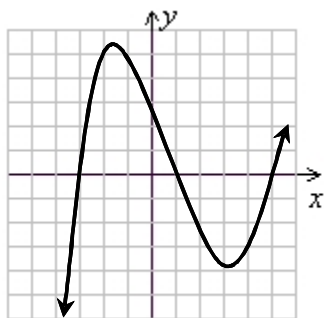
C) $x \in (-3, 1) \cup (5, \infty)$

B) $x \in (-\infty, -3] \cup [1, 5]$

D) $x \in [-3, 1] \cup [5, \infty)$

Ans: A Difficulty Level: Moderate Section: 7

131. Use the graph to solve the inequality $f(x) \leq 0$. Write the answer in interval notation.



(Gridlines are spaced one unit apart.)

A) $x \in (-\infty, -3) \cup (1, 5)$

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

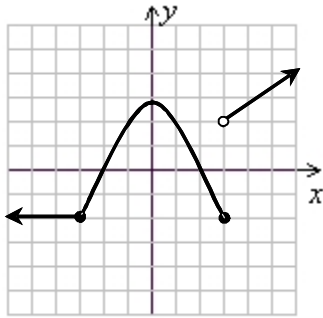
B) $x \in (-\infty, -3] \cup [1, 5]$

D) $x \in [-3, 1] \cup [5, \infty)$

Ans: B Difficulty Level: Moderate Section: 7

132. Name the interval(s) where the function is increasing, decreasing, or constant. Write answers using interval notation. Assume all endpoints have integer values.

$$y = f(x)$$



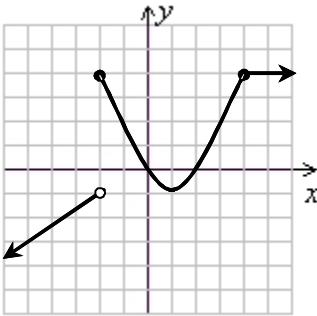
(Gridlines are spaced one unit apart.)

Ans: $f(x) \uparrow: x \in (-3, 0) \cup (3, \infty)$; $f(x) \downarrow: x \in (0, 3)$; constant: $x \in (-\infty, -3)$

Difficulty Level: Moderate Section: 7

Use the following to answer questions 133-135:

$$y = g(x)$$



(Gridlines are spaced one unit apart.)

133. Name the interval(s) where the function is increasing. Write the answer in interval notation. Assume all endpoints have integer values.

A) $g(x) \uparrow: x \in (1, \infty)$

C) $g(x) \uparrow: x \in (-\infty, -2) \cup (1, 4)$

B) $g(x) \uparrow: x \in (-1, 4)$

D) $g(x) \uparrow: x \in (-\infty, -1) \cup (-1, 4)$

Ans: C Difficulty Level: Moderate Section: 7

134. Name the interval(s) where the function is decreasing. Write the answer in interval notation. Assume all endpoints have integer values.

A) $g(x) \downarrow: x \in (-1, 4)$

C) $g(x) \downarrow: x \in (-\infty, -2) \cup (-2, 1)$

B) $g(x) \downarrow: x \in (-2, 1)$

D) $g(x) \downarrow: x \in (-\infty, -1) \cup (-1, 4)$

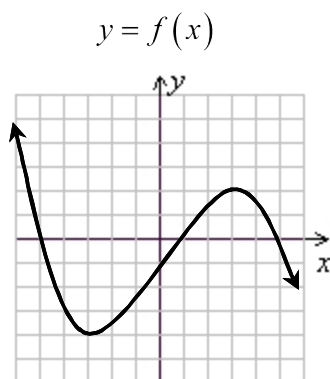
Ans: B Difficulty Level: Moderate Section: 7

135. Name the interval(s) where the function is constant. Write the answer in interval notation. Assume all endpoints have integer values.

- A) $x \in (-2, \infty)$ C) $x \in (-\infty, -2) \cup (4, \infty)$
 B) $x \in (4, \infty)$ D) $x \in (-\infty, -1) \cup (4, \infty)$

Ans: B Difficulty Level: Moderate Section: 7

Use the following to answer questions 136-141:



(Gridlines are spaced one unit apart.)

136. Determine the domain and range of the function.

- A) $x \in [-5, 5], y \in [-4, 2]$ C) $x \in [-5, 5], y \in (-\infty, \infty)$
 B) $x \in (-\infty, \infty), y \in [-4, 2]$ D) $x \in (-\infty, \infty); y \in (-\infty, \infty)$

Ans: D Difficulty Level: Difficult Section: 7

137. Determine the zeroes of the function.

- A) $(-5, 0), (0, -1), (1, 0), (5, 0)$ C) $(-5, 0), (5, 0), (1, 0)$
 B) $(0, -5), (-1, 0), (0, 1), (0, 5)$ D) $(0, -5), (0, 5), (0, 1)$

Ans: A Difficulty Level: Difficult Section: 7

138. Determine the interval(s) where the function is greater than or equal to zero or less than or equal to zero.

- A) $f(x) \geq 0: x \in [0, -1];$
 $f(x) \leq 0: x \in (-\infty, 0] \cup [-1, 2]$
 B) $f(x) \geq 0: x \in (-\infty, 0] \cup [-1, 2];$
 $f(x) \leq 0: x \in [0, -1]$
 C) $f(x) \geq 0: x \in [-5, 1];$
 $f(x) \leq 0: x \in (-\infty, -5] \cup [1, 5]$
 D) $f(x) \geq 0: x \in (-\infty, -5] \cup [1, 5];$
 $f(x) \leq 0: x \in [-5, 1]$

Ans: D Difficulty Level: Difficult Section: 7

139. Determine the interval(s) where $f(x)$ is increasing, decreasing, or constant.

- A) $f(x) \uparrow: x \in (-3, 3);$
 $f(x) \downarrow: x \in (-\infty, -3) \cup (3, \infty);$
 constant: none
- B) $f(x) \uparrow: x \in (-\infty, -3) \cup (3, \infty);$
 $f(x) \downarrow: x \in (-3, 3);$
 constant: none
- C) $f(x) \uparrow: x \in (-4, 2);$
 $f(x) \downarrow: x \in (-\infty, -4) \cup (2, \infty);$
 constant: none
- D) $f(x) \uparrow: x \in (-\infty, -4) \cup (2, \infty);$
 $f(x) \downarrow: x \in (-4, 2);$
 constant: none

Ans: A Difficulty Level: Difficult Section: 7

140. Determine the location of any max or min value(s).

- A) max: $(-5, 4);$
 min: $(-3, -4)$
- B) max: $(3, 2);$
 min: $(-3, -4)$
- C) max: $(-3, -4);$
 min: $(3, 2)$
- D) max: none;
 min: none

Ans: B Difficulty Level: Difficult Section: 7

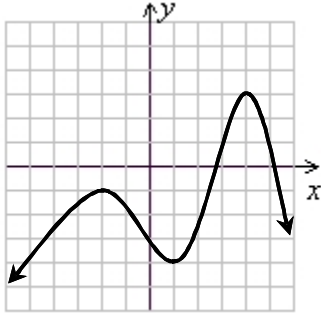
141. Determine the equations of asymptotes (if any).

- A) $x = 0, y = -1$ B) $x = -5, x = 1, x = 5$ C) $x = 1$ D) none

Ans: D Difficulty Level: Difficult Section: 7

142. Determine the location of any max or min value(s).

$$y = p(x)$$



(Gridlines are spaced one unit apart.)

- A) max: (4, 3);
min: (1, -4)
- B) max: (-2, -1), (4, 3);
min: (1, -4)
- C) max: (-2, -1);
min: (1, -4), (4, 3)
- D) max: none;
min: none

Ans: B Difficulty Level: Difficult Section: 7

Use the following to answer questions 143-144:

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

143. Use the difference quotient to find a rate of change formula for the function.

- A) $\frac{\Delta y}{\Delta x} = 3x^2 + 3xh + 3$
- B) $\frac{\Delta y}{\Delta x} = 3x^2 + 3xh + h^2 + 3$
- C) $\frac{\Delta y}{\Delta x} = 3x^2 + 3x + h^2 + 3$
- D) $\frac{\Delta y}{\Delta x} = 3x^2 + 3x + 3$

Ans: B Difficulty Level: Difficult Section: 7

144. Calculate the rate of change for the interval [1.00, 1.01]. Round your answer to the nearest tenth.

- A) 4.8 B) 4.9 C) 5.0 D) 5.2

Ans: C Difficulty Level: Difficult Section: 7

Use the following to answer questions 145-148:

$$f(x) = 2x^2 + 4x + 5 \text{ and } g(x) = 5x^2 - 3x$$

145. Find $h(x) = f(x) + g(x)$.

A) $h(x) = 8x^2 + x + 5$

C) $h(x) = 8x^2 - 2x + 8$

B) $h(x) = 8x^2 - 2x + 5$

D) $h(x) = 3x^2 + 3x + 8$

Ans: A Difficulty Level: Routine Section: 8

146. State the domain of $h(x) = f(x) + g(x)$.

Ans: $x \in (-\infty, \infty)$

Difficulty Level: Routine Section: 8

147. Find $h(x) = f(x) - g(x)$.

Ans: $h(x) = -x^2 - 7x - 5$

Difficulty Level: Routine Section: 8

148. State the domain of $h(x) = f(x) - g(x)$.

Ans: $x \in (-\infty, \infty)$

Difficulty Level: Routine Section: 8

Use the following to answer questions 149-152:

$$f(x) = 5x^2 - 4x - 5 \text{ and } g(x) = 3x - 4$$

149. Find $h(x) = f(x) + g(x)$.

Ans: $h(x) = 5x^2 - 5x + 1$

Difficulty Level: Routine Section: 8

150. State the domain of $h(x) = f(x) + g(x)$.

Ans: $x \in (-\infty, \infty)$

Difficulty Level: Routine Section: 8

151. Find $h(x) = f(x) - g(x)$.

A) $h(x) = -4x^2 - 2x + 2$

C) $h(x) = 4x^2 + 2x + 2$

B) $h(x) = -4x^2 - 2x - 6$

D) $h(x) = 4x^2 + 2x + 6$

Ans: D Difficulty Level: Routine Section: 8

152. State the domain of $h(x) = f(x) - g(x)$.

Ans: $x \in (-\infty, \infty)$

Difficulty Level: Routine Section: 8

Use the following to answer questions 153-158:

$$p(x) = \sqrt{x+3} \text{ and } q(x) = \sqrt{x-4}$$

153. Compute the product $H(x) = (p \cdot q)(x)$.

- A) $H(x) = (x+3)(x-4)$ C) $H(x) = \sqrt{x-1}$
 B) $H(x) = \sqrt{(x+3)(x-4)}$ D) $H(x) = \sqrt{x+1}$

Ans: B Difficulty Level: Moderate Section: 8

154. Evaluate $(p \cdot q)(1)$.

Ans: not defined

Difficulty Level: Routine Section: 8

155. Evaluate $(p \cdot q)(1)$.

- A) -12 B) $2\sqrt{3}$ C) $-2\sqrt{3}$ D) not defined

Ans: D Difficulty Level: Routine Section: 8

156. Evaluate $(p \cdot q)(5)$.

- A) 8 B) $2\sqrt{2}$ C) 2 D) not defined

Ans: B Difficulty Level: Routine Section: 8

157. Evaluate $(p \cdot q)(8)$.

Ans: $2\sqrt{11}$

Difficulty Level: Routine Section: 8

158. Determine the domain of $(p \cdot q)$.

- A) $x \in (-3, 4)$ C) $x \in (-\infty, -3) \cup (4, \infty)$
 B) $x \in [-3, 4]$ D) $x \in (-\infty, -3] \cup [4, \infty)$

Ans: D Difficulty Level: Difficult Section: 8

Use the following to answer questions 159-160:

$$f(x) = x^2 - 64 \text{ and } g(x) = x + 8$$

159. Find $h(x) = \frac{f(x)}{g(x)}$.

Ans: $h(x) = x - 5$

Difficulty Level: Moderate Section: 8

160. Determine the domain of $\frac{f}{g}$.

- A) $x \in (-\infty, 3) \cup (3, \infty)$ C) $x \in (3, \infty)$
 B) $x \in (-\infty, -3) \cup (-3, \infty)$ D) $x \in (-\infty, \infty)$

Ans: A Difficulty Level: Moderate Section: 8

Use the following to answer questions 161-168:

$$f(x) = 5x + 8 \text{ and } g(x) = x - 6$$

161. Find the sum of f and g .

$$\text{Ans: } (f + g)(x) = -4x + 3$$

Difficulty Level: Routine Section: 8

162. Determine the domain of the sum of f and g .

$$\text{Ans: } x \in (-\infty, \infty)$$

Difficulty Level: Routine Section: 8

163. Find the difference of f and g .

$$\text{Ans: } (f - g)(x) = x + 8$$

Difficulty Level: Routine Section: 8

164. Determine the domain of the difference of f and g .

$$\text{Ans: } x \in (-\infty, \infty)$$

Difficulty Level: Routine Section: 8

165. Find the product of f and g .

$$\text{Ans: } (f \cdot g)(x) = 2x^2 + x - 36$$

Difficulty Level: Moderate Section: 8

166. Determine the domain of the product of f and g .

$$\text{Ans: } x \in (-\infty, \infty)$$

Difficulty Level: Routine Section: 8

167. Find the quotient of f and g .

$$\text{Ans: } \left(\frac{f}{g}\right)(x) = \frac{5x + 9}{x - 4}$$

Difficulty Level: Moderate Section: 8

168. Determine the domain of the quotient of f and g .

$$\text{A) } x \in (-\infty, 2) \cup (2, \infty) \qquad \text{C) } x \in \left(-\infty, \frac{7}{5}\right) \cup \left(\frac{7}{5}, \infty\right)$$

$$\text{B) } x \in (-\infty, -2) \cup (-2, \infty) \qquad \text{D) } x \in (-\infty, \infty)$$

Ans: A Difficulty Level: Moderate Section: 8

Use the following to answer questions 169-176:

$$f(x) = \frac{3}{x-2} \text{ and } g(x) = \frac{4}{x+5}$$

169. Find the sum of f and g .

A) $(f+g)(x) = \frac{7}{x+3}$

C) $(f+g)(x) = \frac{7x-3}{(x-2)(x+5)}$

B) $(f+g)(x) = \frac{7x+13}{(x-2)(x+5)}$

D) $(f+g)(x) = \frac{7x+7}{(x-2)(x+5)}$

Ans: D Difficulty Level: Routine Section: 8

170. Determine the domain of the sum of f and g .

A) $x \in (-5, 2)$

C) $x \in (-\infty, -5) \cup (-5, 2) \cup (2, \infty)$

B) $x \in (-\infty, -5) \cup (2, \infty)$

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

Ans: C Difficulty Level: Routine Section: 8

171. Find the difference of f and g .

A) $(f-g)(x) = \frac{-x+23}{(x-2)(x+5)}$

C) $(f-g)(x) = \frac{-x+3}{(x-2)(x+5)}$

B) $(f-g)(x) = \frac{-x+7}{(x-2)(x+5)}$

D) $(f-g)(x) = -\frac{1}{x-7}$

Ans: A Difficulty Level: Routine Section: 8

172. Determine the domain of the difference of f and g .

A) $x \in (-5, 2)$

C) $x \in (-\infty, -5) \cup (-5, 2) \cup (2, \infty)$

B) $x \in (-\infty, -5) \cup (2, \infty)$

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

Ans: C Difficulty Level: Routine Section: 8

173. Find the product of f and g .

A) $(f \cdot g)(x) = \frac{12}{x^2-10}$

C) $(f \cdot g)(x) = \frac{12}{(x-2)(x+5)}$

B) $(f \cdot g)(x) = \frac{12}{x-10}$

D) $(f \cdot g)(x) = \frac{7}{(x-2)(x+5)}$

Ans: C Difficulty Level: Moderate Section: 8

174. Determine the domain of the product of f and g .

A) $x \in (-5, 2)$

C) $x \in (-\infty, -5) \cup (-5, 2) \cup (2, \infty)$

B) $x \in (-\infty, -5) \cup (2, \infty)$

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

Ans: C Difficulty Level: Routine Section: 8

175. Find the quotient of f and g .

A) $\left(\frac{f}{g}\right)(x) = \frac{3}{4(x-2)(x+5)}$

C) $\left(\frac{f}{g}\right)(x) = \frac{3x+5}{4x-2}$

B) $\left(\frac{f}{g}\right)(x) = \frac{4x-2}{3x+5}$

D) $\left(\frac{f}{g}\right)(x) = \frac{3x+15}{4x-8}$

Ans: D Difficulty Level: Moderate Section: 8

176. Determine the domain of the quotient of f and g .

A) $x \in (-\infty, -5) \cup (-5, \infty)$

C) $x \in (-\infty, -5) \cup (-5, 2) \cup (2, \infty)$

B) $x \in (-\infty, 2) \cup (2, \infty)$

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

Ans: C Difficulty Level: Moderate Section: 8

Use the following to answer questions 177-180:

$$f(x) = \sqrt{x+2} \text{ and } g(x) = 3x - 5$$

177. Find $h(x) = (f \circ g)(x)$.

A) $h(x) = \sqrt{3x+3}$

C) $h(x) = 3\sqrt{x-1}$

B) $h(x) = \sqrt{3x-3}$

D) $h(x) = 3\sqrt{x+2} - 5$

Ans: B Difficulty Level: Difficult Section: 8

178. State the domain of $h(x) = (f \circ g)(x)$.

A) $x \in (1, \infty)$ B) $x \in [1, \infty)$ C) $x \in (-2, \infty)$ D) $x \in [-2, \infty)$

Ans: B Difficulty Level: Moderate Section: 8

179. Find $h(x) = (g \circ f)(x)$.

A) $h(x) = 3\sqrt{x+3}$

C) $h(x) = 3\sqrt{x-1}$

B) $h(x) = \sqrt{3x-3}$

D) $h(x) = 3\sqrt{x+2} - 5$

Ans: D Difficulty Level: Difficult Section: 8

180. State the domain of $h(x) = (g \circ f)(x)$.

A) $x \in [0, \infty)$ B) $x \in [-2, \infty)$ C) $x \in [1, \infty)$ D) $x \in (-\infty, \infty)$

Ans: B Difficulty Level: Moderate Section: 8

Use the following to answer questions 181-184:

$$f(x) = x^2 - 5x \text{ and } g(x) = x - 2$$

181. Find $h(x) = (f \circ g)(x)$.

Ans: $h(x) = x^2 - 9x + 14$

Difficulty Level: Difficult Section: 8

182. State the domain of $h(x) = (f \circ g)(x)$.

Ans: $x \in (-\infty, \infty)$

Difficulty Level: Routine Section: 8

183. Find $h(x) = (g \circ f)(x)$.

Ans: $h(x) = x^2 - 3x - 3$

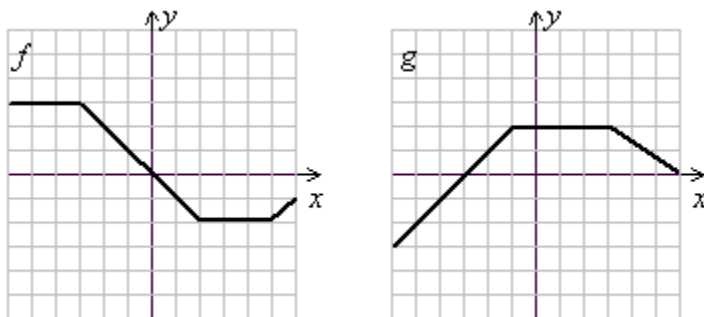
Difficulty Level: Difficult Section: 8

184. State the domain of $h(x) = (g \circ f)(x)$.

Ans: $x \in (-\infty, \infty)$

Difficulty Level: Routine Section: 8

Use the following to answer questions 185-192:



(Gridlines on each graph are spaced one unit apart.)

185. Find $(f+g)(-3)$.

A) 0 B) 1 C) 2 D) 3

Ans: D Difficulty Level: Moderate Section: 8

186. Find $(f-g)(2)$.

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

Ans: A Difficulty Level: Moderate Section: 8

187. Find $(f+g)(0)$.

Ans: 2

Difficulty Level: Moderate Section: 8

188. Find $\left(\frac{f}{g}\right)(-2)$.

A) 0 B) 1 C) 2 D) 3

Ans: C Difficulty Level: Moderate Section: 8

189. Find $(f \cdot g)(-4)$.
 A) -4 B) -3 C) -2 D) -1
 Ans: B Difficulty Level: Moderate Section: 8

190. Find $(f - g)(-1)$.
 Ans: -1
 Difficulty Level: Moderate Section: 8

191. Find $\left(\frac{f}{g}\right)(-3)$.
 Ans: undefined
 Difficulty Level: Moderate Section: 8

192. Find $(f \cdot g)(3)$.
 Ans: -4
 Difficulty Level: Moderate Section: 8

Use the following to answer questions 193-194:

Due to a lightning strike, a forest fire begins to burn and is spreading outward in a shape that is roughly circular. The radius of the circle is modeled by the function $r(t) = 3t$, where t is the time in minutes and r is measured in meters.

193. Write a function for the area burned by the fire directly as a function of t by computing $(A \circ r)(t)$.
 A) $(A \circ r)(t) = 3\pi t^2$ C) $(A \circ r)(t) = 6\pi t$
 B) $(A \circ r)(t) = 9\pi t^2$ D) $(A \circ r)(t) = 3\pi^2 t^2$
 Ans: B Difficulty Level: Difficult Section: 8

194. Find the area of the circular burn after 50 minutes.
 A) $7500\pi^2 \text{ m}^2$ B) $7500\pi \text{ m}^2$ C) $300\pi \text{ m}^2$ D) $22,500\pi \text{ m}^2$
 Ans: D Difficulty Level: Moderate Section: 8

195. For $h(x) = (\sqrt{x+3} - 1)^4 - 8$, find two functions f and g such that $(f \circ g)(x) = h(x)$.
 Ans: $f(x) = x^4 - 8$ and $g(x) = \sqrt{x+3} - 1$ (Answers may vary.)
 Difficulty Level: Difficult Section: 8

196. For $H(x) = \sqrt[3]{x^2 - 10} + 3$, find two functions p and q such that $(p \circ q)(x) = H(x)$. (Answers may vary.)
 A) $p(x) = x - 10$ and $q(x) = \sqrt[3]{x^2} + 3$ C) $p(x) = \sqrt[3]{x} + 3$ and $q(x) = x^2 - 10$
 B) $p(x) = x^2 - 10$ and $q(x) = \sqrt[3]{x} + 3$ D) $p(x) = \sqrt[3]{x^2} + 3$ and $q(x) = x - 10$
 Ans: C Difficulty Level: Difficult Section: 8