

Chapter 1, sections 1 - 5 Test
Functions and Their Graphs

Section 1: Rectangular Coordinates

- Know the coordinate plane
- Plot points
- Distance Formula
- Midpoint Formula

Examples:

1. Draw the coordinate plane. Label the x- and y-axes, the origin, and the quadrants.
2. Plot the points (-2, 6) and (4, -3)
 - a) Find the distance between the points
 - b) Find the midpoint of the line segment joining the points
3. Determine the quadrant(s) in which (x, y) is located so that the conditions are satisfied.
 - a) $x > 0, y < 0$
 - b) $x < 0, xy > 0$
4. Translate points in a plane.
 - a) A triangle has vertices at (-1,2), (1,-4) and (2,3). Shift the triangle 2 units to the left 4 units downward, and find the vertices of the shifted triangle.

Additional problems from book: page 117 #1 – 10, page 9 #1 – 6, 11 – 20, 23 – 40, 51 – 54

Section 2: Graphs of Equations

- Find x- and y-intercepts of the graph of the equation
- Find the equation of a circle.

Examples:

5. $f(x) = \frac{1}{3}x + 2$
6. $y = |3x - 5| - 4$
7. $g(x) = \sqrt{2x + 1} + 6$
8. $h(x) = \sqrt{2x - 1} - 6$
9. $y = (x - 2)^2 - 3$
10. $y = x^3 - 3x^2 - 25x + 75$
11. Write the standard form of the equation of the circle having endpoints of the diameter at (-2, 3) and (6, -3).

Additional problems from book: page 117 #25 – 28, 43 – 44, page 22 #9 – 20, 57 – 64

Section 3: Linear Equations in Two Variables

- Find slope between two points
- Use slope to graph lines
- Graph lines
- Write linear equations in two variables
- Use slope to identify parallel and perpendicular lines

Examples:

12. Find the slope of the line passing through the points (3, -4) and (-7, 1)
13. Graph the lines
 - a) $2x - 5y = 15$
 - b) $y = -2$
 - c) $2x - 5 = 11$
14. Write the equation of each line with the given characteristics
 - a) contains (3, -2) and has slope of $\frac{3}{2}$
 - b) has x-intercept of 5 and slope of $-\frac{1}{2}$
 - c) passes through (3, -2) and (3, 5)
 - d) contains $f(2) = 5$ and $f(-2) = -1$
 - e) passes through (1, -5) and is parallel to line with equation $3x - 5y = 10$
 - f) passes through (-3, -7) and is perpendicular to the line with equation $2x - 7y = 7$
 - g) contains (5, -4) and is perpendicular to the line with equation $y = 6$

Additional problems from book: page 118 #47 – 64, page 123 #7 – 9

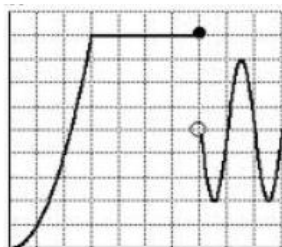
Section 4: Functions

- Determine whether relations between two variables are functions – graphically and by equation
- Use function notation and evaluate functions, including piecewise functions
- State the domain of the graph of an equation – graphically and by equation
- Evaluate difference quotients

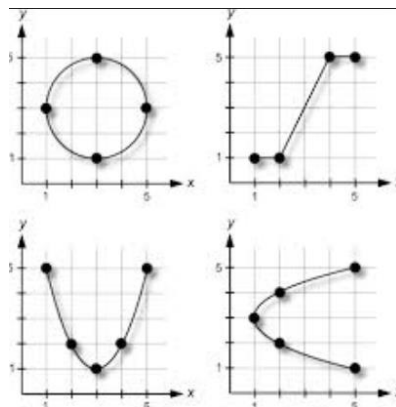
Examples:

15. Use the Vertical Line Test to determine whether y is a function of x.

a)



b – e)



16. Determine whether the equation represents y as a function of x .

- a) $2x - y = 5$
- b) $y = \sqrt{x - 3}$
- c) $y = \frac{1}{x+3} + 2$
- d) $x + y^2 = 16$
- e) $x^2 - y = 4$

17. State the domain of each function. Then verify your results by graphing it on your calculator or iPad

- a) $5x - 2y = 12$
- b) $y = 2(x - 3)^2 - 1$
- c) $y = \frac{2}{x^2 - 8x + 12} - 3$
- d) $y = \sqrt{x^2 - 25}$
- e) $y = \sqrt[3]{x - 6}$

18. Evaluate the function at each specified value.

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

- a) $f(3)$
- b) $f(-2)$
- c) $f(\frac{1}{3})$
- d) $f(x + 3)$

19. Evaluate the piecewise function at each specified value.

$$f(x) = \begin{cases} -5x - 2, & x \leq -2 \\ x^2 - 2, & x > -2 \end{cases}$$

- a) $f(3)$
- b) $f(-2)$
- c) $f(\frac{1}{3})$
- d) $f(-3)$

20. Find each difference quotient and simplify your answer.

a) given $f(x) = x^2 - 2x + 9$, find $\frac{f(x+h) - f(x)}{h}, h \neq 0$

b) given $f(x) = x^2 - 6x + 5$, find $\frac{f(x+h) - f(x)}{h}, h \neq 0$

Additional problems from book:

page 119 #67 – 76, 79, 81 – 84 (state the domain and range of each also), 103 – 104

page 123 #10, 11

page 65 #115 – 116

Section 5: Analyzing Graphs of Functions

- Find the zeros of functions
- Determine the average rate of change of a function

Examples:

21. Find the zeros of the functions.

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

b) $g(x) = \sqrt{5x - 2} - 5$

c) $h(x) = \frac{x-5}{2x+1}$

d) $k(x) = |x - 1| - 6$

22. Find the average rate of change of the function from x_1 to x_2 .

a) $f(x) = 5x - 6$, $x_1 = 3$, $x_2 = 5$

b) $f(x) = x^3 + 12x - 2$, $x_1 = 0$, $x_2 = 2$

Additional problems from book: page 119 #85 – 88, 95, 96
page 123 #12 – 14 (just find the zeros)