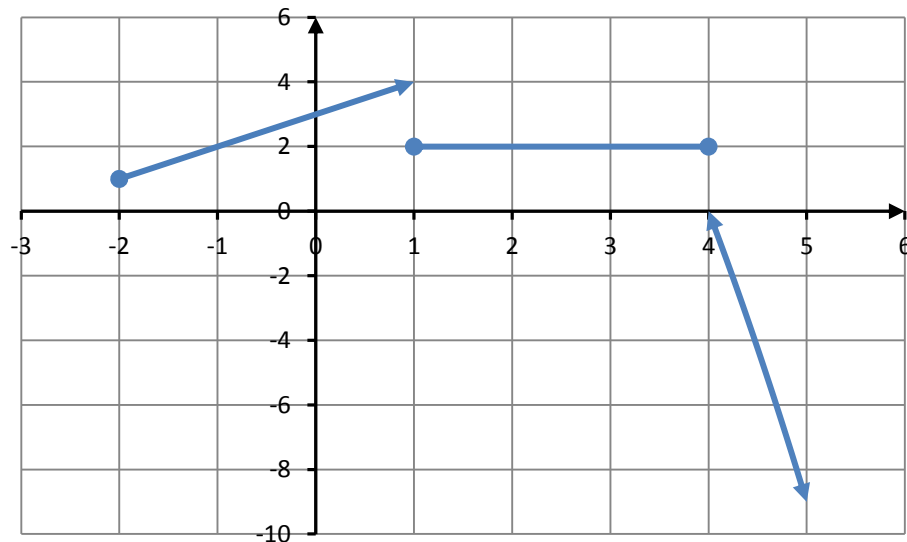


Practice Test 1

1. Determine whether the equation $|y| - x = 3$ defines a function.
Answer: y is not a function of x .
2. Determine whether the function $f(x) = x^4 - 9x^2$ even, odd, or neither. Find the intercepts of the function.
Answer: The function is even
3. $f(x) = \sqrt{x-3}$ and $g(x) = f(2x+6)$. Find the domain of each function.
Answer: $D_f = [3, \infty)$; $D_g = [-1.5, \infty)$

4. Graph the piecewise function $f(x) = \begin{cases} x + 3 & \text{if } -2 \leq x < 1 \\ 2 & \text{if } 1 \leq x \leq 4 \\ 16 - x^2 & \text{if } x > 4 \end{cases}$. Find the domain, $f(-2)$, and $f(5)$.

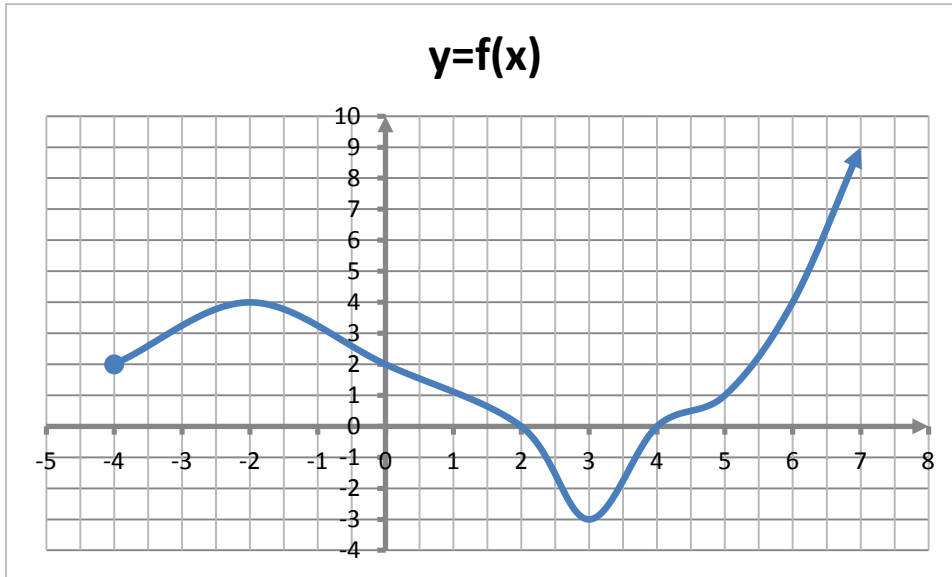
Answer: Domain = $[-2, \infty)$; $f(-2) = 1$; $f(5) = 9$



5. Use the graph of $f(x)$ in Figure 1 to find the following.
 - a. $f(3)$ and $f(6)$.
 - b. The domain.
 - c. The x-intercepts.
 - d. The values of x for which function is negative.
 - e. The y-intercept.
 - f. The zeros of the function.
 - g. the value of x for which $f(x) = 1.5$
 - h. The range
 - i. The average change of f from 1 to 5
 - j. The values, if any, for which f has a local maximum.

- k. The values, if any, for which f has a local minimum.
- l. What is the local minimum of the function?
- m. Find the absolute minimum and maximum.
- n. The intervals on which the function is increasing
- o. The intervals on which the function is decreasing

Figure 1



Answer:

- a. $f(3) = -3$ and $f(6) = 4$.
 - b. The domain = $[-4, \infty)$.
 - c. The x-intercepts: $(2,0)$ and $(4,0)$
 - d. The values of x for which function is negative: $(2,4)$
 - e. The y-intercept: $(0,2)$
 - f. The zeros of the function: 2 and 4
 - g. the value of x for which $f(x) = 1.5$: $x = 0.5$ and $x = 5.25$
 - h. The range: $[-3, \infty)$
 - i. The average change of f from 1 to 5 is 0.
 - j. The value for which f has a local maximum is -2
 - k. The value for which f has a local minimum is 3.
 - l. The local minimum of the function is -3
 - m. The absolute minimum is -3 . There is no absolute maximum.
 - n. The intervals on which the function is increasing are $(-4, -2)$ and $(3, \infty)$.
 - o. The interval on which the function is decreasing is $(-2,3)$.
6. The graph of a function $f(x)$ is given in Figure 2. Write the equation of $f(x)$ in piecewise form.

f(x)

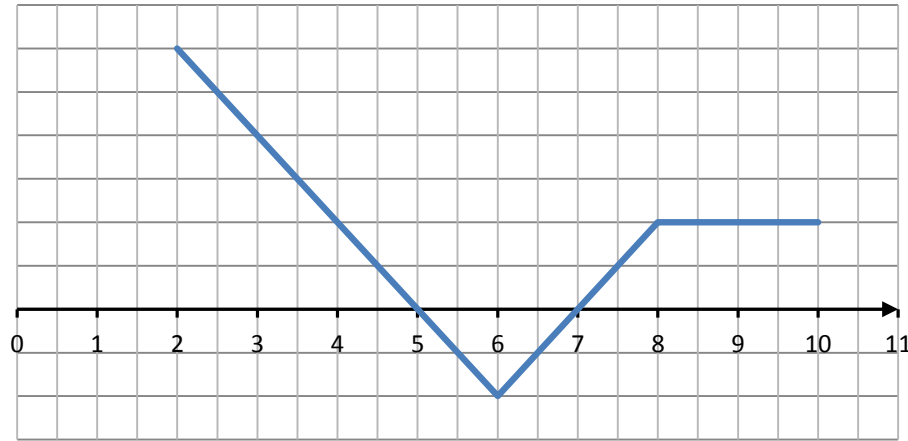


Figure 2

Answer: $f(x) = \begin{cases} -x + 5 & \text{if } 2 \leq x < 6 \\ x - 7 & \text{if } 6 \leq x < 8 \\ 3 & \text{if } 8 \leq x < \infty \end{cases}$

Remark

The function also can be written in the form $\begin{cases} |x - 6| - 1 & \text{if } 2 \leq x < 8 \\ 3 & \text{if } 8 \leq x < \infty \end{cases}$

7. Find the average rate of change of the function $f(x) = \sqrt{x - 1}$ from $x_1 = 1$ to $x_2 = 10$

Answer: $\frac{f(x_2) - f(x_1)}{x_2 - x_1} = \frac{1}{3}$

8. Find the difference quotient of $f(x) = 3x^2 - 2x$

Answer: $\frac{f(x+h) - f(x)}{h} = 6x - 2 + 3h$

9. Find the intercepts of $f(x) = |2x - 1| - 3$

Answer: $(2, 0), (-1, 0), (0, -2)$

10. Find all points at which the line $y = 3$ crosses the graph of

$$f(x) = \sqrt{2x + 6} - x$$

Answer: $(-1, 3)$ and $(-3, 3)$

11. Write the equation in slope-intercept form for the line passing through $(-5,1)$ and perpendicular to the line whose equation is $x + 4y - 12 = 0$.

Answer: $y = 4x + 21$

12. Write the equation in general form for the line passing through $(-4, -3)$ and parallel to the line whose intercepts are $(0,2)$ and $(4,0)$.

Answer: $x + 2y + 10 = 0$

13. Find all values of x for which the function $f(x) = |5 - x| - 1$ is positive. Write the answer in interval notation.

Answer: $(-\infty, 4) \cup (6, \infty)$

14. Find the domain of $f(x) = \sqrt{2x + 4} + \frac{x+3}{x^2-7x-60}$

Answer: $[-4, 12) \cup (12, \infty)$

15. Solve the compound inequality $5 \leq 1 - 2x < 7$

Answer: $(-3, -2]$