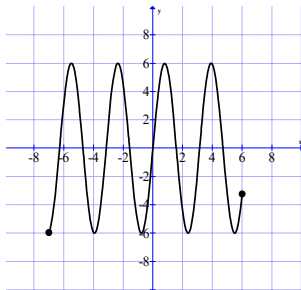


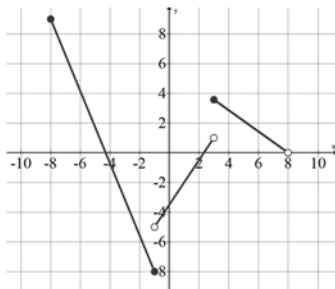
Multiple Choice

- Evaluate the function $f(x) = x^2 + 6x$ at $f(8)$.
 a. $f(8) = 56$ b. $f(8) = 16$ c. $f(8) = 112$
 d. $f(8) = 72$ e. $f(8) = 120$
- Evaluate the function $f(x) = \frac{13-x}{-1+x}$ at $f(5)$.
 a. $f(5) = 1.5$ b. $f(5) = 1.75$ c. $f(5) = 2.25$
 d. $f(5) = 1.25$ e. $f(5) = 2$
- Find the domain of the following function: $f(x) = \sqrt[3]{x-4}$
 a. $(-\infty, \infty)$ b. $[0, \infty)$ c. $(0, \infty)$ d. $[4, \infty)$ e. $(-\infty, 4]$
- What is the domain and range of the function that is graphed below?



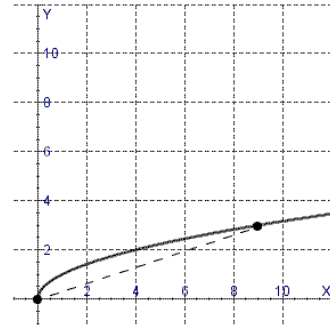
- Domain: $(-7, 6)$, Range: $[-6, 6]$
 - Domain: $(-\infty, \infty)$, Range: $[-6, 6]$
 - Domain: $[-7, 6]$, Range: $[-6, 6]$
 - Domain: $[-7, 6]$, Range: $(-\infty, \infty)$
 - Domain: $[-6, 6]$, Range: $[-7, 6]$
- What is the average rate of change of the function $f(x) = x^3 - 2x^2$ between $x = 0$ and $x = 8$?
 a. 44 b. 47 c. 48 d. 46 e. 41
 - What is the average rate of change of the function $f(x) = x + x^2$ between $x = 0$ and $x = 5$?
 a. 6 b. 7 c. 10 d. 8 e. 5

- The graph of the function is sketched as shown. Determine the interval where the function is increasing.



- $(-1, -8)$ b. $(3, 8)$
 c. $(-8, -1)$ d. $(-1, 3)$
 e. $(3, -2)$
- How many units must we shift the graph of $f(x) = 2(x+8)^4$ to obtain the graph of $f(x) = 2(x+12)^4$?
 a. 3 left
 b. 4 left
 c. 4 right
 d. 2 right
 e. 8 left

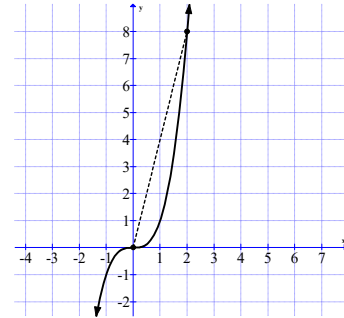
- The graph of a function is given as follows:



Determine the average rate of change for the function between the indicated values of the variable.

- $-\frac{1}{2}$ b. $-\frac{1}{3}$ c. $\frac{1}{2}$ d. $\frac{1}{3}$ e. $\frac{1}{9}$

- The graph of a function is sketched as follows:



Determine the average rate of change of the function between the indicated values of the variable.

- 2 b. -2 c. 4 d. -4 e. $-\frac{1}{4}$

- Suppose the graph of f is given. Describe how the graph of the function can be obtained from the graph of f .

$$y = 4f(x+5) - 3$$

- Shift the graph of $y = f(x)$ to the right 4 units, stretch vertically by a factor of 5, and then shift downward 3 units.
- Shift the graph of $y = f(x)$ to the left 4 units, stretch vertically by a factor of 5, and then shift downward 3 units.
- Shift the graph of $y = f(x)$ to the right 5 units, stretch vertically by a factor of 4, and then shift downward 3 units.
- Shift the graph of $y = f(x)$ to the left 5 units, stretch vertically by a factor of 4, and then shift upward 3 units.
- Shift the graph of $y = f(x)$ to the left 5 units, stretch vertically by a factor of 4, and then shift downward 3 units.

Free Response

12. Find the domain of the function. $g(x) = \sqrt{8-x} + 3$

13. Sketch the graph of the piecewise defined function.

$$f(x) = \begin{cases} 2 & \text{if } x < -2 \\ -x & \text{if } -2 \leq x \leq 2 \\ -2 & \text{if } x > 2 \end{cases}$$

14. A man is running around a circular track 200 m in circumference. An observer uses a stopwatch to record the runner's time at the end of each lap, obtaining the data in the table.

Time (s)	Distance (m)
32	200
66	400
104	600
153	800
209	1000
270	1200
341	1400
419	1600

- (a) What was the man's average speed (rate) between 66 s and 153 s? Please round your answer to the nearest hundredth.
- (b) What was the man's average speed (rate) between 270 s and 419 s? Please round your answer to the nearest hundredth.

For problems 15 - 21, graph, determine the domain and range, and determine where the graph is increasing.

15. $f(x) = x^2 - 3$.

16. $f(x) = \frac{1}{x-2}$.

17. $f(x) = -\sqrt{6-x}$.

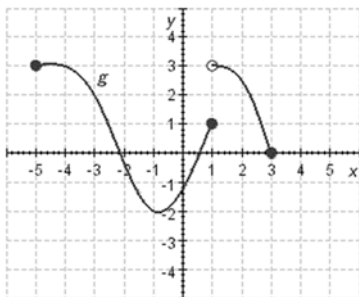
18. $f(x) = (x-1)^3 + 2$.

19. $f(x) = \frac{1}{(x-3)^2} + 1$.

20. $f(x) = \sqrt[3]{2x-6} - 1$.

21. $f(x) = -|x+2| - 1$.

22. Determine where the function is increasing.



23. A function is given. Determine the average rate of change of the function between the values of the

variable. $g(x) = \frac{2}{x+1}$; $x = 0$, $x = h$

24. Evaluate the following piecewise defined function at $f(1)$, $f(3)$, and $f(7)$.

$$f(x) = \begin{cases} 1 & \text{if } x < 3 \\ 8x-6 & \text{if } x \geq 3 \end{cases}$$

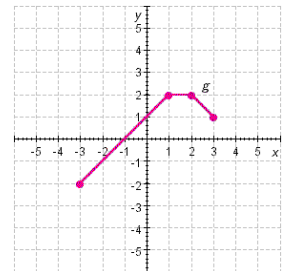
25. Use the function $f(x) = x^2 + 1$ to evaluate the following expressions and simplify. $f(a+5)$

26. For the function $f(x) = 4x^3$, find $\frac{f(a+h) - f(a)}{h}$.

27. Find the domain of the function. $h(x) = \sqrt{x-7}$

28. The graph of g is given. Sketch the graph of the function.

$y = g(x) - 2$



29. In a certain country, income tax T is assessed according to the following function of income x .

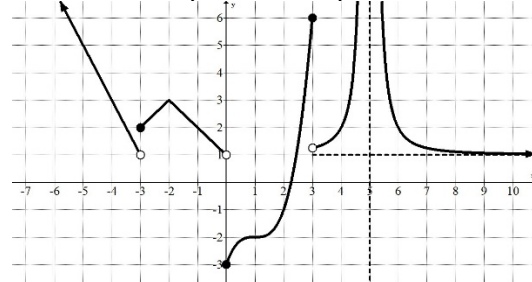
$$T(x) = \begin{cases} 0 & \text{if } 0 \leq x \leq 10,000 \\ 0.1x & \text{if } 10,000 < x \leq 20,000 \\ 1,800 + 0.12x & \text{if } 20,000 < x \end{cases}$$

- (a) Find $T(3,000)$. (b) Find $T(15,000)$.
 (c) Find $T(30,000)$.

30. Graph the following function:

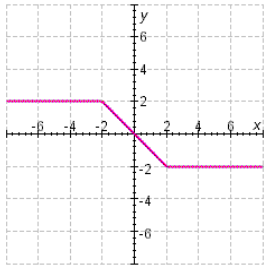
$$f(x) = \begin{cases} (x+5)^2 - 2, & x < -3 \\ \sqrt{1-x} + 1, & -3 \leq x \leq 1 \\ \frac{1}{x-3} - 2, & x > 1 \end{cases}$$

31. Determine the equation of the piece-wise function.

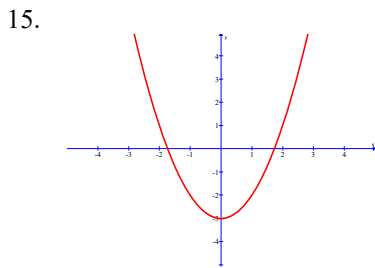


Answer Section

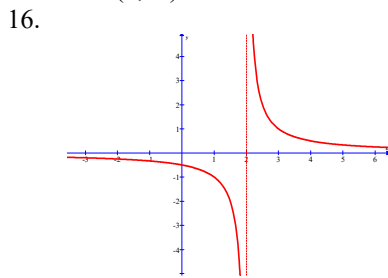
1. C
2. E
3. A
4. C
5. C
6. A
7. D
8. B
9. D
10. C
11. E
12. $(-\infty, 8]$
- 13.



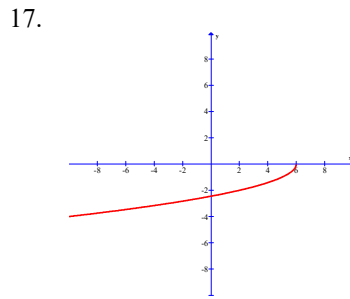
14. a. $\frac{400}{87}$
- b. $\frac{400}{149}$



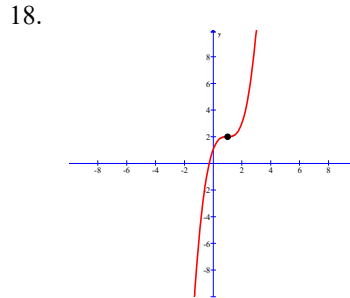
D: $(-\infty, \infty)$
 R: $[-3, \infty)$
 Inc: $(0, \infty)$



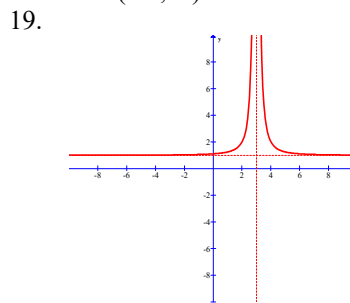
D: $(-\infty, 2) (2, \infty)$
 R: $(-\infty, 0) (0, \infty)$
 Inc: none



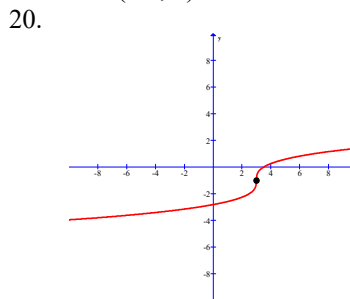
D: $(-\infty, 6]$
 R: $(-\infty, 0]$
 Inc: $(-\infty, 6)$



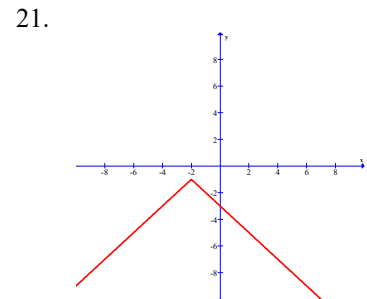
D: $(-\infty, \infty)$
 R: $(-\infty, \infty)$
 Inc: $(-\infty, \infty)$



D: $(-\infty, 3) (3, \infty)$
 R: $(1, \infty)$
 Inc: $(-\infty, 3)$

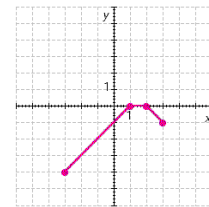


D: $(-\infty, \infty)$
 R: $(-\infty, \infty)$
 Inc: $(-\infty, \infty)$

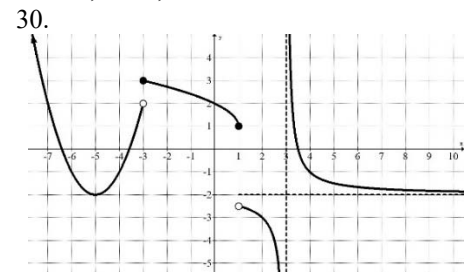


D: $(-\infty, \infty)$
 R: $(-\infty, -1]$
 Inc: $(-\infty, -2)$

22. $(-1, 1)$
23. $\frac{-2}{h+1}$
24. $f(1) = 1, f(3) = 18, f(7) = 50$
25. $f(a+5) = a^2 + 10a + 26$
26. $12a^2 + 12ah + 4h^2$
27. $[7, \infty)$
- 28.



29. 0; 1500; 5400



30.

$$f(x) = \begin{cases} -2x-5 & x < -3 \\ -|x+2|+3 & -3 \leq x < 0 \\ (x-1)^3 - 2 & 0 \leq x \leq 3 \\ \frac{1}{(x-5)^2} + 1 & x > 3 \end{cases}$$