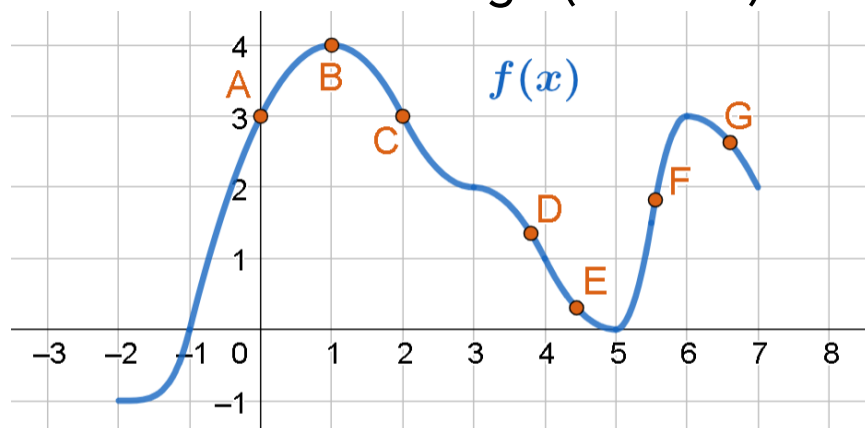
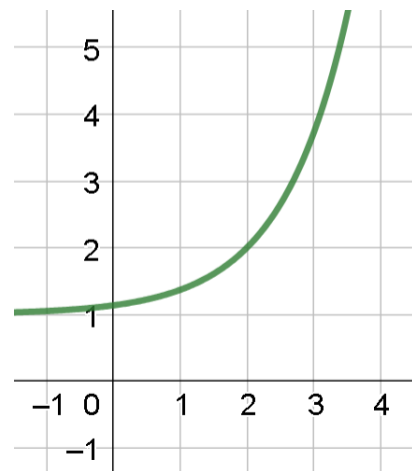


Function Vocab + Rates of Change (1.1-1.3) Homework



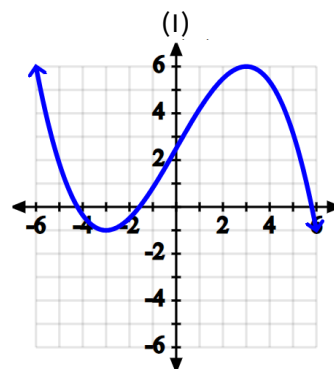
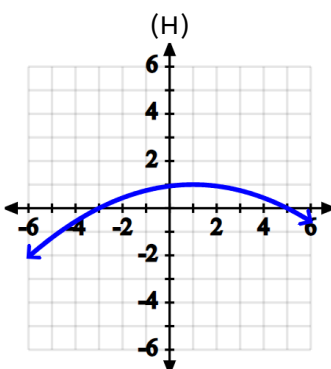
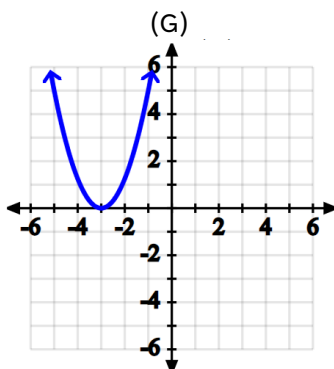
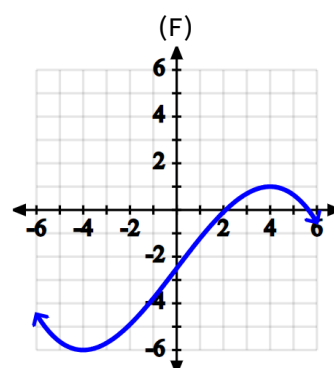
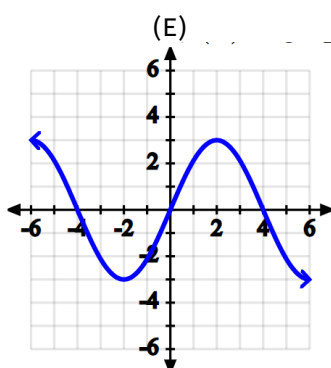
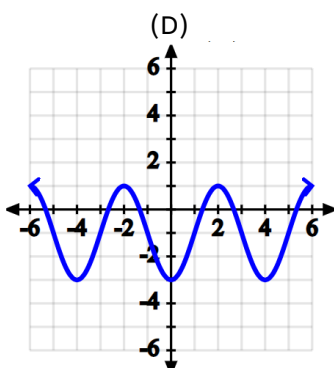
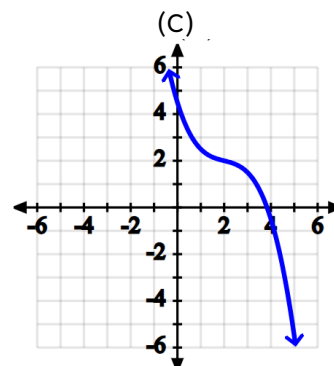
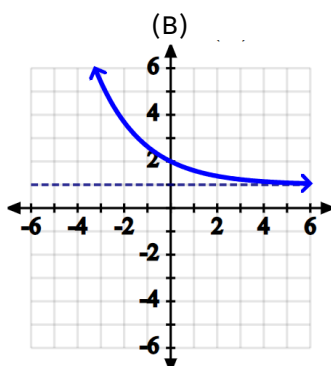
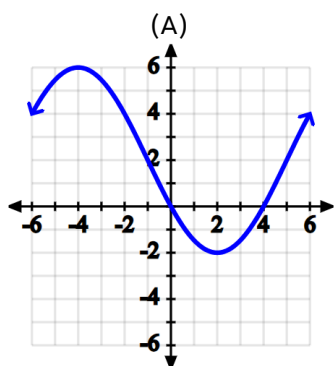
Consider $f(x)$ graphed above. Let A, B, C, D, E, F , and G be the x -coordinates of the labelled points.

- Identify the domain and range of $f(x)$. Express in interval notation.
- Over what interval(s) does $f(x)$ increase? Give your answer in interval notation.
- Over what interval(s) does $f(x)$ decrease? Give your answer in interval notation.
- Find the average rate of change of $f(x)$ over the interval $0 \leq x \leq 4$.
- What is the absolute maximum value of $f(x)$?
- Find the global minimum value of $f(x)$?
- List all x -values at which $f(x)$ has local maxima.
- List all x -values at which $f(x)$ has relative minima.
- Identify all zeros of $f(x)$.
- Which is greater, the rate of change of $f(x)$ at $x = 0$ or the rate of change of $f(x)$ at $x = 2$? Provide your rationale.
- Put the following in order from least to greatest:
 - The average rate of change of $f(x)$ over the interval $[E, G]$
 - The average rate of change of $f(x)$ over the interval $[A, C]$
 - The average rate of change of $f(x)$ over the interval $[B, F]$
 - The average rate of change of $f(x)$ over the interval $[B, D]$
 - The average rate of change of $f(x)$ over the interval $[D, F]$
- Consider the function $g(x)$ graphed to the right. Rank the following in order from least to greatest:
 - The rate of change of $g(x)$ at $x = 1$
 - The rate of change of $g(x)$ at $x = 3$
 - The average rate of change of $g(x)$ over the interval $[1, 2]$
 - The average rate of change of $g(x)$ over the interval $[1, 3]$



Questions #13-21 each describe a function. Match the number of the verbal description with the letter of the corresponding graph.

13. The absolute maximum of this function is 1. The average rate of change of this function over the interval $-5 \leq x \leq -1$ is 0.
14. The global maximum value of this function is 1. This function does not have a global minimum.
15. For any two input values a and b with $a > b$, $f(a) < f(b)$. The rate of change of this function at $x = 1$ appears to be equal to the rate of change of the function at $x = 3$.
16. The average rate of change of this function over the interval $-5 \leq x \leq -1$ is 0. The output of this function is never negative.
17. This function has a negative rate of change on the interval $(-\infty, -3)$. This function has a relative maximum value at $x = 3$.
18. This function has a local minimum value at $x = -2$. Over the interval $[-3, 2]$, the average rate of change of this function is 1.
19. This function maps an input value of 0 to an output value of 0. This function increases for $x > 2$.
20. The rate of change of this function is always negative. The rate of change of this function appears to be greater at $x = 2$ than at $x = -2$.
21. $x = 2$ is a zero of this function. This function decreases on the interval $(-\infty, -4)$ and on the interval $(4, \infty)$.



Function Vocab + Rates of Change (1.1-1.3) HW Answers

1. Domain: $[-2, 7]$ Range: $[-1, 4]$
2. $f(x)$ increases over $[-2, 1]$ and over $[5, 6]$ (note: if you wrote parentheses () instead of square brackets, you would still get credit. For questions about increasing/decreasing, you can always just use the parentheses and you'll be okay)
3. $f(x)$ decreases over $[1, 5]$ and over $[6, 7]$ (note: if you wrote parentheses () instead of square brackets, you would still get credit. For questions about increasing/decreasing, you can always just use the parentheses and you'll be okay)
4. $\frac{f(4)-f(0)}{4-0} = \frac{1-3}{4-0} = -\frac{1}{2}$
5. 4
6. -1
7. $f(x)$ has a local maximum at $x = 1$ and at $x = 6$
8. $f(x)$ has a relative minimum at $x = -2$, at $x = 5$, and at $x = 7$
9. $f(-1) = 0$ and $f(5) = 0$, so $x = -1$ and $x = 5$ are the zeros of $f(x)$
10. At $x = 0$, the rate of change of $f(x)$ is positive. At $x = 2$, the rate of change of $f(x)$ is negative. The rate of change of $f(x)$ at $x = 0$ is greater than the rate of change of $f(x)$ at $x = 2$.
11. IV, III, II, V, I
Of the five given average rates of change, only III and IV are negative. IV is the steeper negative slope, so IV is the least slope (most negative). III is the second to least slope. Of the remaining three average rates of change, II is zero (since the y -value does not change between the endpoints of the interval) while I and V are positive. So II is next in our list of least to greatest. Between I and V, I is the steeper positive slope. It is the greatest of the five given average rates of change.
12. I, III, IV, II
13. D
14. H
15. C
16. G
17. I
18. E
19. A
20. B
21. F