

Name _____
Mr. Schlansky

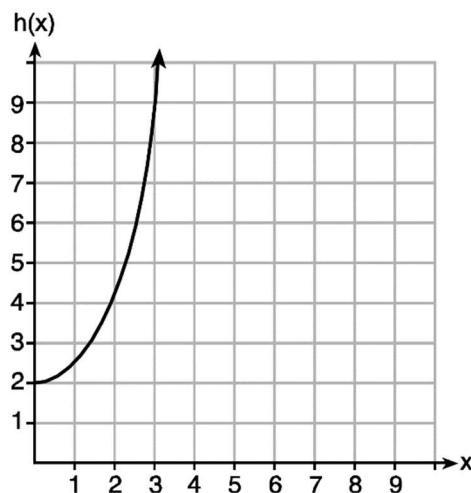
Date _____
Algebra II

Average Rate of Change

1. Given the functions $g(x)$, $f(x)$, and $h(x)$ shown below:

x	$f(x)$
0	1
1	2
2	5
3	7

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



The correct list of functions ordered from greatest to least by average rate of change over the interval $0 \leq x \leq 3$ is

- 1) $f(x)$, $g(x)$, $h(x)$
- 2) $h(x)$, $g(x)$, $f(x)$
- 3) $g(x)$, $f(x)$, $h(x)$
- 4) $h(x)$, $f(x)$, $g(x)$

2. The function $h(x)$ is given in the table below. Which of the following gives its average rate of change over the interval $2 \leq x \leq 6$?

(1) $-\frac{3}{2}$

(2) $\frac{6}{4}$

(3) $-\frac{7}{6}$

(4) -1

x	$h(x)$
0	10
2	9
4	6
6	3

3. Jessica is planning to build a square playing field. She wants to see how long the sides of the field will need to be for different areas. Her results are summarized in the following table. All values are rounded to the *nearest hundredth* when necessary.

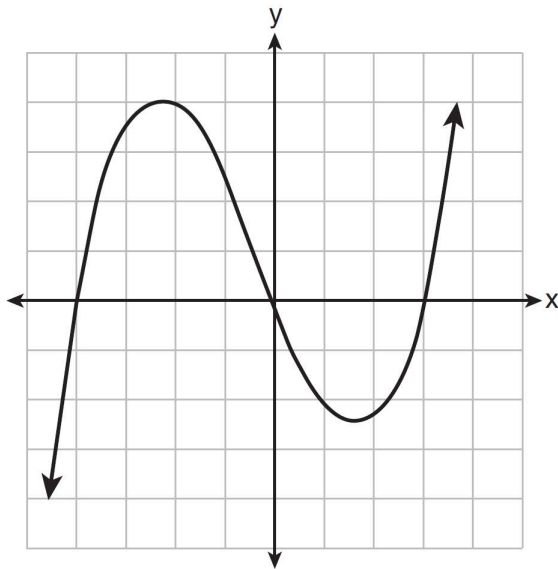
What is the average rate of change in the side length as the area increases from 100 square feet to 900 square feet?

Area (square feet)	Side Length (feet)
100	10
200	14.14
300	17.32
400	20
500	22.36
600	24.49
700	26.46
800	28.28
900	30

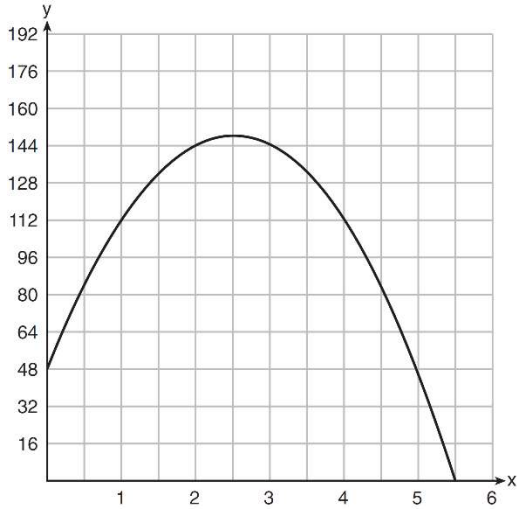
4. What is the average rate of change from $f(0)$ to $f(2)$?

x	f(x)
0	1
1	2
2	5
3	7

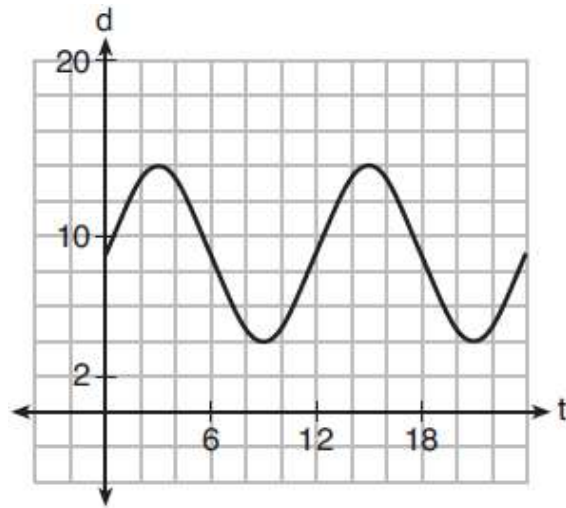
5. The graph of $p(x)$ is shown below. What is the average rate of change over the interval $-4 \leq x \leq 1$?



6. A ball is thrown into the air from the edge of a 48-foot-high cliff so that it eventually lands on the ground. The graph below shows the height, y , of the ball from the ground after x seconds. What is the average rate of change of the ball between 1 and 5 seconds?



7. The depth of the water at a marker 20 feet from the shore in a bay is depicted in the graph below.



If the depth, d , is measured in feet and time, t , is measured in hours since midnight, what is the average rate of change of the depth of the water between 3AM and 9AM?

8. For the function $f(x) = 3^x$, find the average rate of change over the interval:

a) $[0,2]$

b) $[-5,-1]$ rounded to the nearest thousandth

9. The world population was 2560 million people in 1950 and 3040 million in 1960 and can be modeled by the function $p(t) = 2560e^{0.017185t}$, where t is time in years after 1950 and $p(t)$ is the population in millions. Determine the average rate of change of $p(t)$ in millions of people per year, from $4 \leq t \leq 8$. Round your answer to the *nearest hundredth*.

10. The value of a new car depreciates over time. Greg purchased a new car in June 2011. The value, V , of his car after t years can be modeled by the equation $\log_{0.8} \left(\frac{V}{1700} \right) = t$. What is the average decreasing rate of change per year of the value of the car from June 2012 to June 2014, to the *nearest ten dollars per year*?

1) 1960

3) 2450

2) 2180

4) 2770

11. The function $f(x) = 2^{-0.25x} \cdot \sin \left(\frac{\pi}{2} x \right)$ represents a damped sound wave function. What is the average rate of change for this function on the interval $[-7, 7]$, to the *nearest hundredth*?

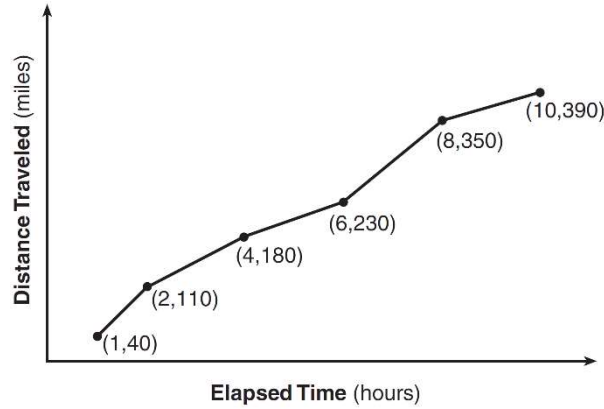
1) -3.66

3) -0.26

2) -0.30

4) 3.36

12. The Jamison family kept a log of the distance they traveled during a trip, as represented by the graph below.



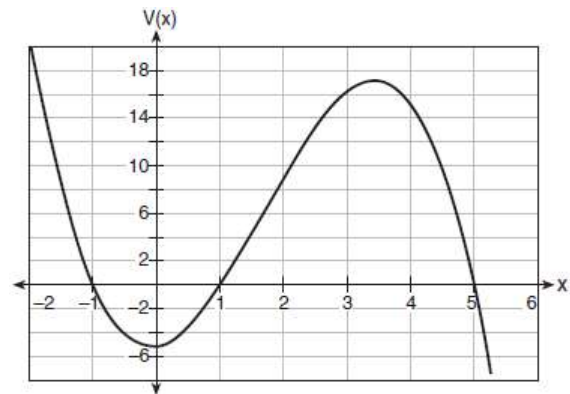
During which interval was their average speed the greatest?

- 1) the first hour to the second hour
- 2) the second hour to the fourth hour
- 3) the sixth hour to the eighth hour
- 4) the eighth hour to the tenth hour

13. A cardboard box manufacturing company is building boxes with length represented by $x + 1$, width by $5 - x$, and height by $x - 1$. The volume of the box is modeled by the function below.

Over which interval is the volume of the box changing at the fastest average rate?

- 1) $[1, 2]$
- 2) $[1, 3.5]$
- 3) $[1, 5]$
- 4) $[0, 3.5]$



14. Joelle has a credit card that has a 19.2% annual interest rate compounded monthly. She owes a total balance of B dollars after m months. Assuming she makes no payments on her account, the table below illustrates the balance she owes after m months.

m	B
0	1000.00
10	1172.00
19	1352.00
36	1770.80
60	2591.90
69	2990.00
72	3135.80
73	3186.00

Over which interval of time is her average rate of change for the balance on her credit card account the greatest?

- 1) month 10 to month 60
- 2) month 19 to month 69
- 3) month 36 to month 72
- 4) month 60 to month 73

15. The function $N(t) = 100e^{-0.023t}$ models the number of grams in a sample of cesium-137 that remain after t years. On which interval is the sample's average rate of decay the fastest?

- 1) $[1, 10]$
- 2) $[10, 20]$
- 3) $[15, 25]$
- 4) $[1, 30]$

16. The distance needed to stop a car after applying the brakes varies directly with the square of the car's speed. The table below shows stopping distances for various speeds.

Speed (mph)	10	20	30	40	50	60	70
Distance (ft)	6.25	25	56.25	100	156.25	225	306.25

Determine the average rate of change in braking distance, in ft/mph, between one car traveling at 50 mph and one traveling at 70 mph. Explain what this rate of change means as it relates to braking distance.