Name _____

**HW L1.4**

1. The total number of hot dogs sold at the concession stand at a football game can be modeled by the function $H$ , where $H(t)$ is the total number of hotdogs sold $t$ hours after the game begins. Selected values of $H$ are given in the table.

| $t(\text{hours})$ | 0 | 1 | 1.5 | 2 | 3 | 3.5 |
|---|---|---|---|---|---|---|
| $H(t)$ hot dogs | 21 | 45 | 51 | 79 | 91 | 102 |

a. At what rate, on average, are hot dogs sold betweent $t = 0$ and $t = 3.5$ ? Show your work and include appropriate units in your answer.

b. Estimate the rate at which hot dogs are sold at $t = 2.5$ . Explain your method.

2. The graph of $y = h(x)$ is shown. Find the average rate of change of $h$ on the interval $[-4, 3]$ .

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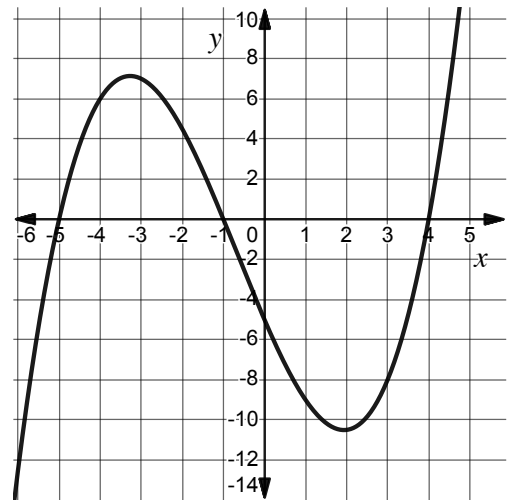
3. Jackie drove $122$ miles from her house in Grand Rapids, MI to her friend's house in Ann Arbor, Michigan. She left her house at 9:25 AM and arrived at 11:15 AM.

   a. Do you think Jackie drove at a constant speed from Grand Rapids to Ann Arbor? Explain why or why not.

   b. What was Jackie's average speed, in miles per hour? Round to the nearest hundredth.

   c. What information would you need to know to be able to determine about how fast Jackie was driving at exactly 11 AM?

4. Order the following from least to greatest.
   A. Average rate of change of $f(x)$ on $[0, 4]$
   B. Average rate of change of $f(x)$ on $[0, 2]$
   C. Average rate of change of $f(x)$ on $[2, 4]$
   D. Average rate of change of $f(x)$ on $[2, 5]$
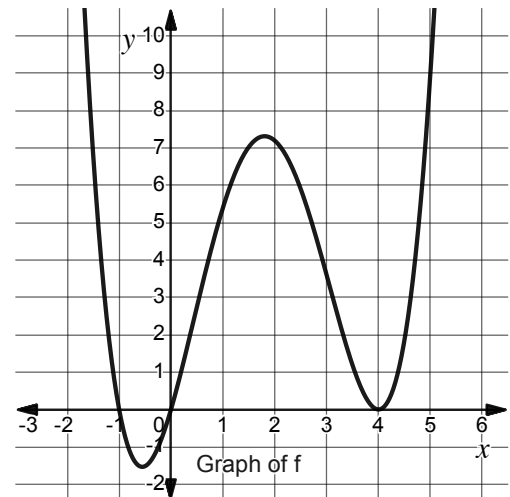


Graph of f

5. The graph of $y = f(x)$ is given. Estimate the instantaneous rate of change of $f$ at $x = 1$.
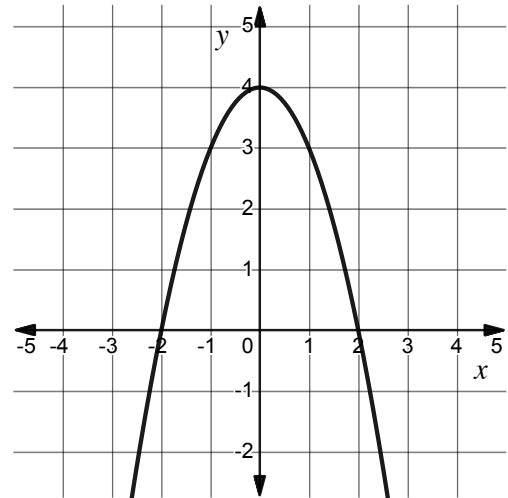


6. Let $f(x) = \ln(x - 3)$. Which is greater: the instantaneous rate of change of $f$ at $x = 4$ or the instantaneous rate of change of $f$ at $x = 10$? Use the graph of $f$ to justify your answer.

7. The weight of a baby duck, $W(t)$, $t$ days after its birth can be modeled by the function $W(t) = 100 - 80e^{-0.2t}$, where $W(t)$ is in grams. Find the average rate of change in the baby duck's weight over its first month of life (Assume the month has $31$ days). Round to the nearest thousandth.

8. The function $g$ has the property that for any values $a$ and $b$ in the domain, where $a < b$, the average rate of change between $x = a$ and $x = b$ is constant. Which of the following statements must be true?

A) $g$ is a constant function

B) $g$ is a linear function

C)
$$\frac{g(b) - g(a)}{b - a} = 1$$

D) The instantaneous rate of change at any $x$ -value between $a$ and $b$ is $0$.

9. The complete graph of a function $g$ is shown. The instantaneous rate of change of $g$ at Point $P$ can be found by calculating the slope of the line between Point $P$ and

A) Point $A$

B) Point $B$

C) Point $C$

D) Point $D$