



# Math122 College Algebra

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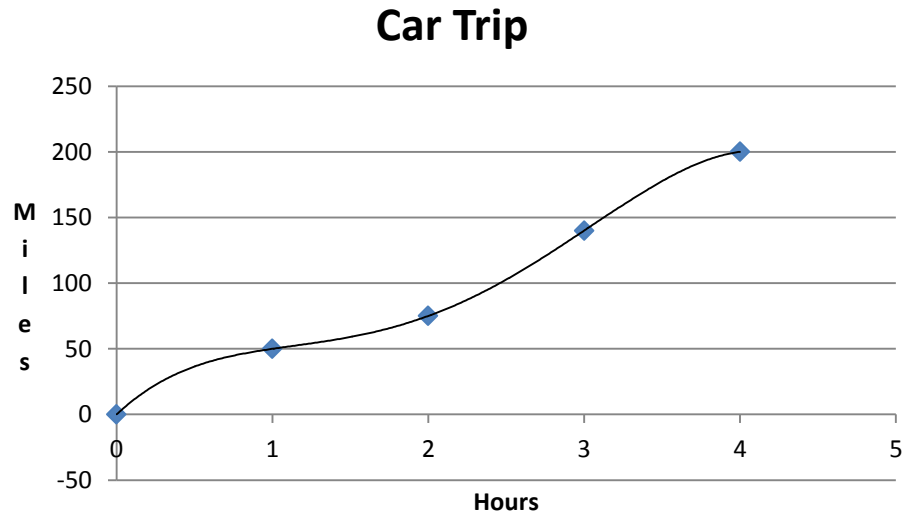
## 3.4

# Average Rate of Change of a Function

- The concept of speed
- You drive a distance of 140 miles in 2 hours then your average speed (or rate of travel) is  
$$\frac{120 \text{ miles}}{2 \text{ hours}} = 70 \text{ miles/hour}$$

# Car Trip

- Suppose you take a car trip and record the distance traveled each minute
- The distance traveled is a function of time
- $d(t) = \text{total distance traveled at time } t$



# Car Trip

- What is  $d(1)$  and  $d(4)$  ?
- What is the average speed between hour 1 and hour 4?
- Answer: The average speed between two points is

$$\text{average speed} = \frac{\text{distance traveled}}{\text{time elapsed}} = \frac{150\text{mi}}{3\text{h}} = 50\text{mi/h}$$

# Average Rate Of Change

- The average rate of change of a function  $f(x)$  between  $x = a$  and  $x = b$  is

$$\text{average rate of change} = \frac{\text{change in } y}{\text{change in } x} = \frac{f(b) - f(a)}{b - a}$$

- What is the average rate of change between hour 0 and 1?
- What is the average rate of change between hour 1 and 3?

# Average Rate Of Change

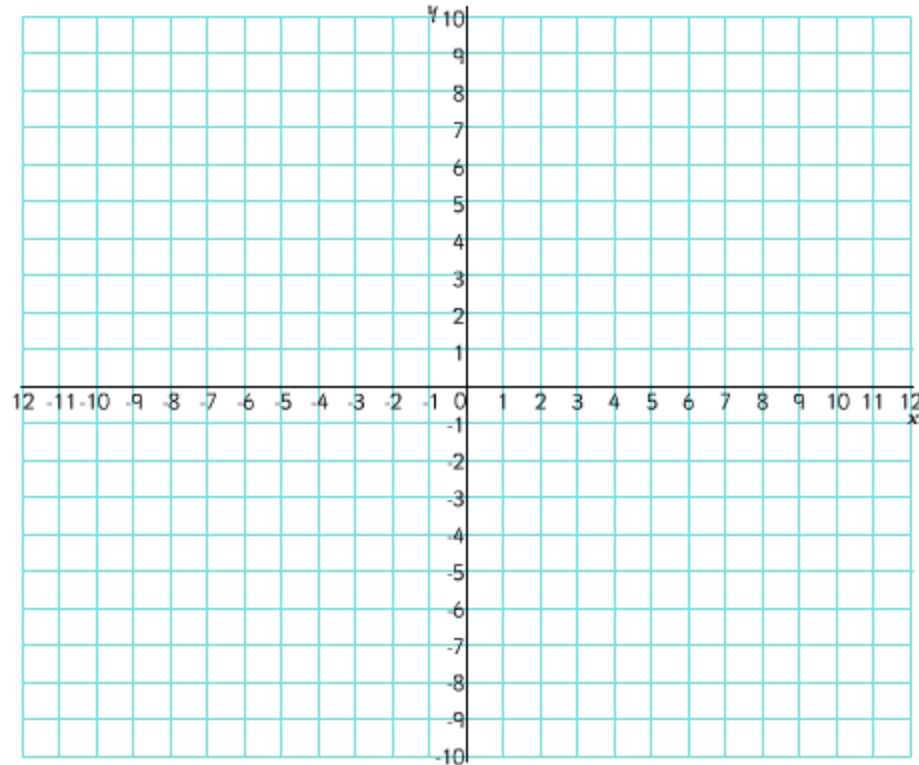
- The average rate of change is the slope of the secant line on the graph between  $x = a$  and  $x = b$
- That is the slope of the line passing through  $(a, f(a))$  and  $(b, f(b))$

# Importance of Average Rate of Change

- Examples of the importance of finding the average rate of change
  - How quickly air temperature falls as a storm approaches
  - How fast revenue increases from a new product release

# Problem

- Consider the function  $f(x) = (x - 3)^2$ 
  1. Find the x-intercepts
  2. Find the y-intercepts
  3. Graph the function



[http://softchalkconnect.com/lesson/files/5iKdsl8IBVuTqX/M6NS8\\_print.html](http://softchalkconnect.com/lesson/files/5iKdsl8IBVuTqX/M6NS8_print.html)



# Problem

- Consider the function  $f(x) = (x - 3)^2$ 
  4. Find the domain
  5. Find the range
  6. Find the interval where the function is increasing
  7. Find the interval where the function is decreasing

# Problem

- Consider the function  $f(x) = (x - 3)^2$ 
  8. Find the average rate of change between  $x = 1$  and  $x = 3$
  9. Find the average rate of change between  $x = 4$  and  $x = 7$