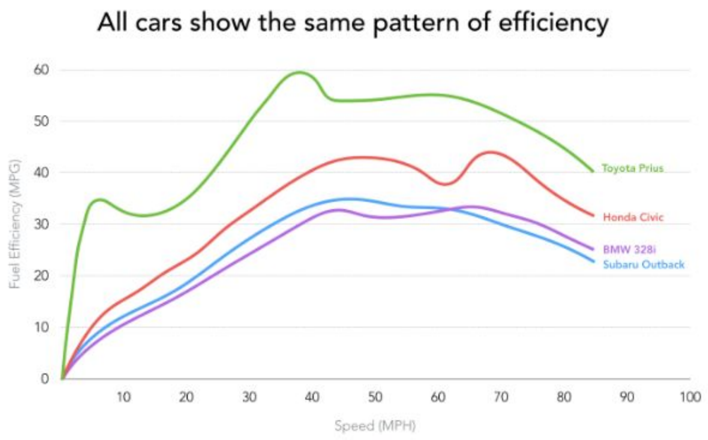
MTH 201 -- Calculus
Module 3A: Interpreting and estimating derivatives

September 21-22, 2020

Agenda for today

- Polling activity over Daily Preparation
- Q&A time
- Practice: Constructing a table of derivative values
- Polling: Interpreting the meaning of a derivative in context
- Quick (ungraded) quiz
- Feedback time

The function shown in this graph gives the fuel efficiency (miles per gallon) of different models of cars as a function of the speed at which they are driven (miles per hour). The units of the derivative are:



- Miles per hour
- Miles per gallon
- Miles per gallon per hour
- Miles per hour per gallon
- Miles per gallon per miles per hour
- Miles per hour per miles per gallo

To 0

The function $g(x)$ has the following values: $g(1) = 3$, $g(3) = 5, g(5) = 0$. Using a *central difference* approximation, the value of $g'(3)$ is

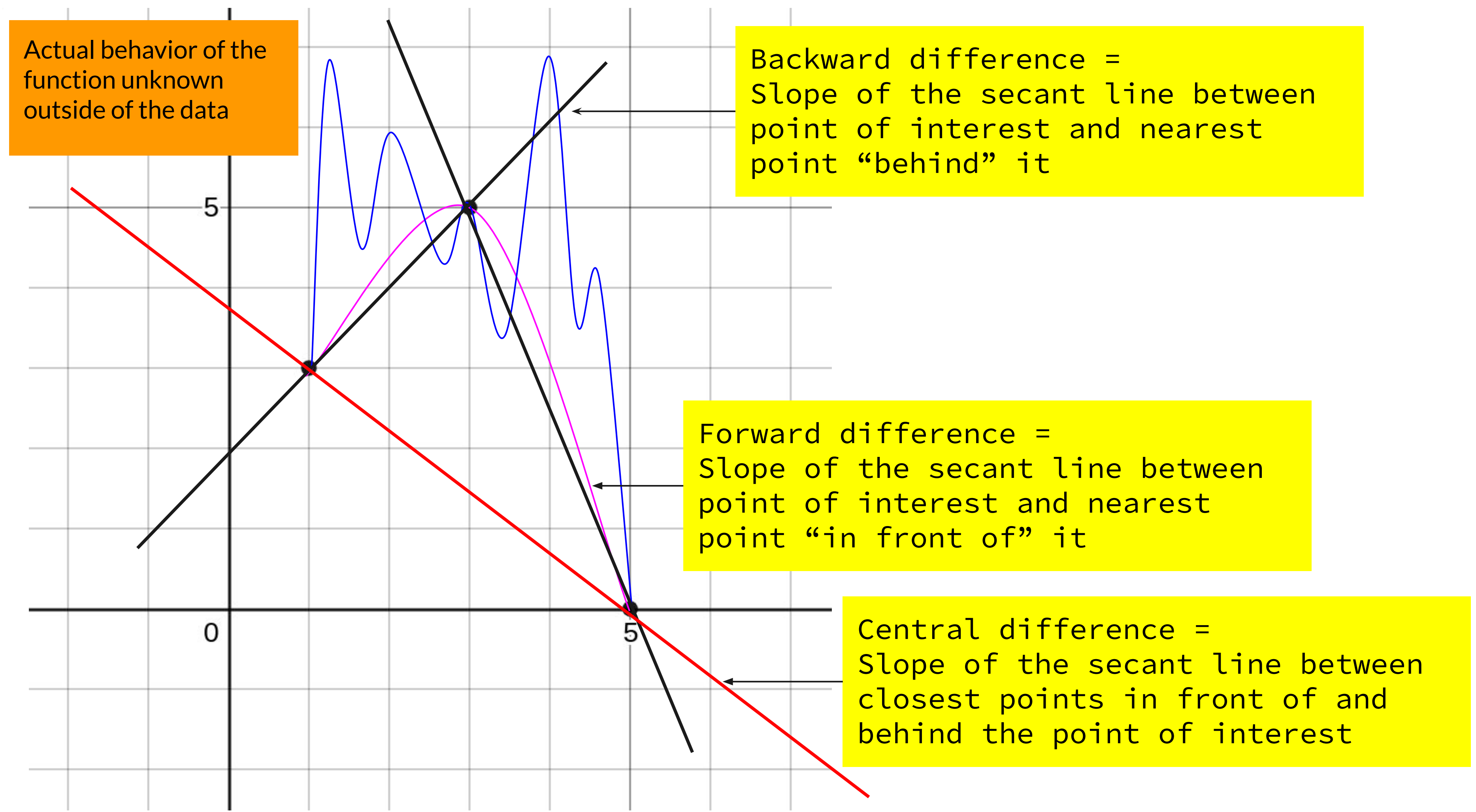
- -1.5
- -1.3333
- -0.75
- 0.75
- 1.333
- 1.5
- None of the above

To 0

The function $g(x)$ has the following values: $g(1) = 3$, $g(3) = 5, g(5) = 0$. Which of the following approximations to $g'(3)$ is a positive number? Select ALL that apply.

- Backward difference
- None of the above
- Forward difference
- Central difference

To 0


Actual behavior of the function unknown outside of the data
Backward difference = Slope of the secant line between point of interest and nearest point “behind” it
Forward difference = Slope of the secant line between point of interest and nearest point “in front of” it
Central difference = Slope of the secant line between closest points in front of and behind the point of interest
5
0
5

Practice

https://jamboard.google.com/d/1PU6QCgxoAMJbE28plQavrH9BhCmxMbdEJas4i--i-fs/edit?usp=sharing

Interpreting what the derivative means

What we know:

- The derivative at a point tells us the instantaneous rate of change at that point
- It’s also the slope of the tangent line at that point

A company manufactures rope, and the total cost of producing r feet of rope is $C(r)$ dollars. It costs $800 to produce 2000 feet of rope. Another way of saying this is

- $C(800) = 2000$
- $C(2000) = 800$
- $C'(800) = 2000$
- $C'(2000) = 800$
- None of the above

Tc 0

The units of $C'(r)$ are

Feet

Dollars

Dollars per foot

Feet per dollar

Suppose we know that $C'(1500) = -0.50$. In practical terms, this would mean that

- When .50 feet of rope is manufactured, the price of manufacturing the rope is dropping.
- When 1500 feet of rope is manufactured, the price of manufacturing the rope is dropping.
- When the price is set at $1500, we have to reduce the amount of rope we're manufacturing.
- When the price is set at $0.50 per foot, we have to reduce the amount of rope we're manufacturing.

To 0

Suppose that $C(2000) = 800$ and $C'(2000) = 0.35$. A reasonable estimate for $C(2100)$ would be

- \$35
- \$765
- \$800.35
- \$835
- None of the above

To 0

The temperature H (in degrees Celsius) of a cup of coffee placed on the kitchen counter is given by $H = f(t)$, where t is the number of minutes since it was placed there. Then $f'(t)$ is

- A positive number
- A negative number
- Zero
- There's not enough information to say anything about f'(t)

The units of $f'(35)$ are

Degrees per minute

Minutes per degree

Degrees

Minutes

None of the above

Tc 0

Suppose $f'(35) = -1.5$ and $f(35) = 68$. Then we can conclude that 35 minutes after the coffee was placed on the counter, [Select all that apply]

- Its temperature is dropping
- its temperature is 66.5 degrees
- Its temperature is 68 degrees Celsius
- Its temperature will drop by about 0.75 degrees in the next 30 seconds
- Its temperature is 1.5 degree lower than when it was first placed on the counter

To 0

Feedback:
http://gvsu.edu/s/1rx

Add sticky notes for comments, ideas, and questions.