May 16, 2014

What is one thing you would change about this class?

What is one thing you would keep the same?

May 14

Students will verbally explain how to determine properties of the function, its derivative and its second derivative.

(using the words:
positive, negative, increasing, decreasing, concave up, concave down, etc...)

Important Things to Know:

Project is due TUESDAY - MAY 20th

This week you can make-up one of each:

* multiple choice
* free response
* quiz

Curve Analysis

The first derivative $\left(\frac{dy}{dx}\right)$ gives information about the slope of the function.

- The function is increasing when the derivative is positive.
- The function is decreasing when the derivative is negative.

A **MAXIMUM** is when the first derivative changes from positive to negative.

A **MINIMUM** is when the first derivative changes from negative to positive.

A ***Critical Point*** is where the first derivative equals 0 or is undefined (denominator = 0).

First Derivative Test for Extrema:

Using a sign chart...

critical point (cp)			
sign $f'(x)$			
behavior $f(x)$			

Justifications:

- $f(x)$ is increasing on (interval) __ $< x <$ __ because $f'(x)$ is positive
- $f(x)$ is decreasing on __ $< x <$ __ because $f'(x)$ is negative
- There is a maximum at (point) $x =$ __ because $f'(x)$ changes from positive to negative.
- There is a minimum at $x =$ __ because $f'(x)$ changes from negative to positive.

The second derivative $\left(\frac{d^2y}{dx^2}\right)$ gives information about the concavity of the function.

- The function is concave up when the second derivative is positive.
- The function is concave down when the second derivative is negative.

An ***Inflection Point*** is when the second derivative equals 0 or is undefined

AND change signs.

A **MAXIMUM** is when the second derivative is negative.

A **MINIMUM** is when the second derivative is positive.

Second Derivative Test for Concavity:

Using a sign chart…

possible inflection points (pip)			
sign $f''(x)$			
behavior $f(x)$			

Justifications:

- $f(x)$ is concave up on __ $<x<$ __ because $f''(x)$ is positive
- $f(x)$ is concave down on __ $<x<$ __ because $f''(x)$ is negative
- $f(x)$ has an inflection point at $x=$ __ because $f''(x)$ changes sign.

Second Derivative Test for Extrema:

- If the value of $f''(x)$ at the critical point is positive, $f(x)$ is concave up and has a minimum.
- If the value of $f''(x)$ at the critical point is negative, $f(x)$ is concave down and has a maximum.

Justifications:

- There is a maximum at $x=$ __ because $f''($__$)$ is negative.
- There is a minimum at $x=$ __ because $f''($__$)$ is positive.

Set #20

Pg 222
#3 – 9 (odd – no calculator)
#11 – 19 (odd – calculator ok)
#30 – 58 (EOE) .... critical points

Set #21

Pg 232 #19 – 52 (do two, skip three)
(after #31 you may use a
calculator to solve for your
critical points) .... first derivative test for extrema

Set #22

Pg 238 #25 – 38
(skip multiples of 3) .... second derivative test for extrema

Set #23

Pg 238 #1, 3 – 18
(multiples of 3), 20 – 23 .... second derivative test for concavity