

## Study Guide - (Unit 4 Quiz 2)

### INCREASING/DECREASING INTERVALS: (Use 1<sup>st</sup> Derivative)

WS 2

1. Find  $f'(x)$ .
2. Find critical numbers for  $f'(x)$ .
3. Place the critical numbers on a number line and pick test values on each interval.
4. Replace these test values in  $f'(x)$  to determine (+ or -).
  - + → Increasing
  - → Decreasing
5. Write your results using interval notation.

### LOCAL MAX/LOCAL MIN: (*Be sure to write in point form!*)

#### (1<sup>st</sup> Derivative Test)

These are found when a function changes from [no VA]:

-increasing to decreasing (Local Max) OR -decreasing to increasing (Local Min)

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### INTERVALS OF CONCAVITY (UP/DOWN): (Use 2<sup>nd</sup> Derivative)

WS 3

1. Find  $f''(x)$ .
2. Find critical points for  $f''(x)$ .
3. Place critical points on a number line and pick test values.
4. Replace these test values in  $f''(x)$  to determine (+ or -).
  - + → Concave UP
  - → Concave DOWN
5. Write your results using interval notation.

### POINTS OF INFLECTION (*Be sure to write in point form!*)

These are found when a continuous function changes from

-(concave up to concave down) OR (concave down to concave up).

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*ANY time a specific point is requested you must replace the x-value into the original equation!*

### SOLUTIONS

1. Inc :  $(-\infty, -5) \cup (5, \infty)$

Dec :  $(-5, 5)$

Local Max :  $(-5, 250)$     Local Min :  $(5, -250)$

2. Concave UP :  $(-\infty, 0) \cup (2, \infty)$

Concave DOWN :  $(0, 2)$

Pts. of Inflection :  $(0, -9)$  and  $(2, -5)$

3. Inc :  $(-\infty, 0) \cup (2, \infty)$

Dec :  $(0, 2)$

Local Max :  $(0, 4)$

Local Min :  $(2, 0)$

Concave UP :  $(1, \infty)$

Concave DOWN :  $(-\infty, 1)$

Pt. of Inflection :  $(1, 2)$

4. Inc :  $(-\infty, -1) \cup (1, \infty)$

Dec :  $(-1, 0) \cup (0, 1)$

Local Max :  $(-1, -2)$

Local Min :  $(1, 2)$

Concave UP :  $(0, \infty)$

Concave DOWN :  $(-\infty, 0)$

Pt. of Inflection : NONE

**NOTE: Use your graphing calculator to validate your sketch for #3,4!**

# Unit 4 Quiz 2- Review

## Calculus 1

1. Find the intervals where the function is increasing and decreasing. Then, use the First Derivative Test to identify the local maximums and minimums.

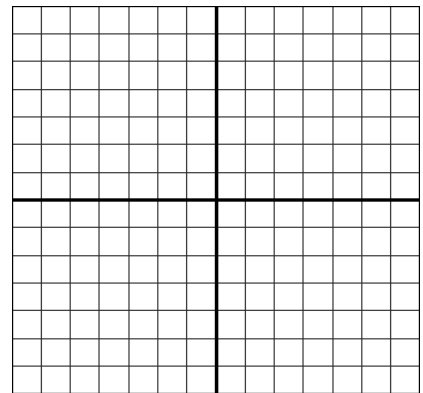
$$f(x) = x^3 - 75x$$

2. Find the intervals of concavity for the function. Then, identify all points of inflection.

$$f(x) = x^4 - 4x^3 + 10x - 9$$

3. For the function  $f(x) = x^3 - 3x^2 + 4$ , find:

- increasing/decreasing intervals
- local extrema
- intervals of concavity,
- point(s) of inflection
- sketch a graph



4. For the function  $f(x) = \frac{x^2 + 1}{x}$ , find:

- increasing/decreasing intervals
- local extrema
- intervals of concavity,
- point(s) of inflection
- sketch a graph

*Note: Consider asymptotes while sketching!*

