MATH 2413 Exam 3 Study Guide

Covers Sections 3.1, 3.3, 3.4, 3.7

Problems to practice: **All homework problems on the Homework List**

Additional Problems from book: Page 242: #7, 8, 9, 10, 11, 13, 33, 34, 35, 37, 38, 39, 43, 44, 47, 50, 55, 87

The content that you should know includes:

- **Basic Form Sheet #14-27** NOTE: Memorize exactly as shown on sheet. Write each one out 10 times to practice! Quiz yourself by randomly picking 6 and write down left side. See if you can write the right side from memory.

- Definition of a *critical number*
- How to *find critical numbers*
- How to *find separation values*
- Difference between a *separation value* and a *critical number* and *relative extrema* (Are all separation values also critical numbers? Are all critical numbers also separation values? Are all critical numbers also relative extrema? Are all relative extrema also critical numbers?)
- Which derivative (1^{st} or 2^{nd}) to use to determine *increasing/decreasing intervals* VS intervals of *concave up/concave down*
- Steps for First Derivative Analysis
- Steps for Second Derivative Analysis
- How to determine if a critical number is a *relative maximum* or a *relative minimum*
- How to determine if a separation value is an *inflection point*
- How to find the *y-value of a point* given an x-value
- How to use *Second Derivative* ***Test*** to determine if a critical number is a relative maximum or relative minimum
- Steps for how to find *absolute extema* on a closed interval using the Extreme Value Theorem (Why does the Extreme Value Theorem require a closed interval? Why does the Extreme Value Theorem require that the function be continuous over the interval? Does Extreme Value Theorem say that absolute extrema cannot exist on an open interval?)
- How to solve a word problem involving *optimization* (including how to form the equation in one variable and determine an interval)
- How to determine intervals of increasing and decreasing and points of relative maximum and relative minimum from a given graph
- How to determine intervals of concave up and concave down and points of inflection from a given graph
- How to draw a portion of a graph given information about the signs of $f\ , f'\ , and\ f''$:
  $f(x) > 0, f(x) < 0, f'(x) > 0, f'(x) < 0, f''(x) > 0, f''(x) < 0$

  *Must label steps
  *Must use correct notation
  *Must use methods demonstrated in class

  Calculator: You may use any calculator for the entire exam.

  Multiple Choice Section: Choose one best answer. No partial credit. No work required.
  Basic Forms Section: Give Basic Forms **as shown on Basic Forms Sheet**
  Free Response Section: Show all of your work and steps. Correct work must be shown to receive credit.