Review For Exam 2

The directions for the exam are as follows:

"WRITE YOUR NAME CLEARLY. Do as many problems as you can for a maximal score of 100. SHOW YOUR WORK!"

1. The exam consists of 10 core problems and 2 extra-credit problems. If you wish, you can do all the 12 problems, but your score will only add up to 100 points. Partial credit will be given.

2. You are allowed to use a scientific calculator. Don't forget to bring it

3. When you are studying for this exam, be sure to work through sections that you know least of all first.

4. Odd exercises have solutions at the back of your textbook.

Warning! Be sure to work on ALL exercises below that are marked in red. 100% of regular exam questions will consist of a subset of the red problems. Do ALL the problems on the review list to insure a perfect mastery of the topic.

Section 3.7

- Be able to efficiently and hastily compute derivatives using the chain rule. (P. 167, Exercises **7-33** [odd], P. 168, Exercises **51-53, 57-67** [odd]).
- **Possible Extra-Credit:** Prove the chain rule formula.

Section 3.8

- Be able to use implicit differentiation techniques (P. 176, Exercises **5, 7, 11, 15, 17, 19, 23**)

Section 3.9

- Be able to apply techniques of implicit differentiation to solve related rates problems. (P. 182-183, Exercises **9, 11, 13, 15, 17, 19, 23, 29**)

Section 4.1

- Be able to find critical points, and extreme points for continuous functions on closed intervals (P. 198, Exercises **23, 25, 31, 33**). Note: You may use the first or second derivative tests instead of a graphing utility to answer part b of these questions. The first and second derivative tests are explained in later sections.
- What are the conditions when the Extreme-Value theorem may be applied? Must a continuous function have absolute minima and maxima over *any* domain?

Section 4.2

- Be able to find intervals where the functions are increasing/decreasing (P.211, Exercises **17, 19, 23, 25, 27, 33**)
- Be able to use the first derivative test to locate local min/max. (P. 211, Exercises **35-41** [odd])
- Know how to determine intervals where the function is concave up or concave down (P. 212, Exercises **51-61** [odd])
- Know how to apply the second derivative test to find local min/max. (P. 212, Exercises **63-69** [odd])

Section 4.3

- Be able to use techniques of this section to sketch curves (P.223, Exercises **9-19** [odd])

Section 4.4

- Solve basic optimization problems (P. 229-231, Exercises **11, 13, 15, 19, 21, 29, 31, 43**)

Section 4.5

- Know how to apply linear approximation methods to obtain numerical estimations. (P. 243, Exercises **21-29** [odd]).

Section 4.6

- Be able to use the Extreme-Value Theorem to prove Rolle's theorem. (P. 244-245)
- The Mean-Value Theorem is one of the most important theorems in calculus. For one thing, it is at the foundation of integration theory and has countless other applications, which include the theory of infinite series (infinite polynomials). You should learn about this theorem and its consequences as much as possible.
- **Possible Extra-Credit:** Prove the Mean-Value Theorem (P. 246).
- **Possible Extra-Credit:** Use the Mean-Value Theorem to prove the inequality $|\sin a - \sin b| \le |a - b|$ for all a and b.
- Be able to apply Rolle's Theorem and the Mean-Value Theorem to a wide range of problems (P. 249-250, Exercises **1-6, 7-13** [odd], **17-23** [odd], **33, 39, 41**).