MATH1210: Midterm 2 Study Guide

The following is an overview of the material that will be covered on the first exam.

§2.9 Differentials and Approximations

- The definition of differentials.
- Approximating increments by differentials.

$$f(x + \Delta x) \approx f(x) + dy = f(x) = f'(x)\Delta x$$

§3.1 Maxima and Minima

- The definition of a global maximum or minimum and an extreme value.
- The Max-Min Existence Theorem. This is the one that says a continuous function on a closed interval always has a max and a min.
- The Critical Point Theorem. This says that maxima and minima always happen at critical points.

§2.2 Monotonicity and Concavity

- The (intuitive) definition of an increasing or decreasing function.
- The Monotonicity Theorem.
- The definition of concavity.
- The Concavity Theorem.
- The definition of an inflection point. Know how to identify inflection points from the graph of a function (See pg İ59 in textbook).

§3.3 Local Extrema and Extrema on Open Intervals

- The definition of a local maximum or minimim as well as the definition of a local extreme value.
- The First Derivative Test.
- The Second Derivative Test.

§3.4 Practical Problems

- You should be able to apply the theorems of the previous 3 sections to "real world" problems.

§3.5 Graphing Functions Using Calculus

- I guarantee that there will be a graphing problem on the exam. It will be worth 20-30 points. Know how to apply the methods of calculus to draw a *detailed* graph of a function. See example 1 in §3.5.

§3.6 The Mean Value Theorem for Derivatives

- The Mean Value Theorem for Derivatives.

- Using the Mean Value Theorem for Derivatives.

§3.7 Solving Equations Numerically

- The Bisection Method for finding solutions to $f(x) = 0$.
- Newton's Method for finding solutions to $f(x) = 0$.
- The Fixed Point Method for solving $g(x) = x$.

§3.8 Antiderivatives

- Know how to compute indefinite integrals, including using the power rule and the "Generalized Power Rule" (in class I called this "the chain rule backwards").
- Don't forget the integration constant, C.