Math 261
Exam 2 Review Sheet

Section 3.1 Tangent Lines and Rates of Change

- Understand secant lines and the average rate of change over an interval
- Understand tangent lines and instantaneous rates of change
- Know basic applications involving velocity and displacement functions
- Be able to use the limit definition to find the slope of a tangent line
- Know how to find the equation of a tangent line, and other basic tangent line computations

Section 3.2 Definition of Derivative

- Memorize the formal limit definition of the derivative of a function
- Know how to find the derivative of a given function using the formal definition
- Understand differentiability on open and closed intervals, and know how to find where a function is differentiable
- Understand right and left hand derivatives, vertical tangent lines, corners, and cusps
- Remember that differentiable functions are continuous, but continuous functions may not be differentiable
- Memorize and be able to apply differentiation formulas for constant functions, lines, and power functions.
- Understand all the different forms of derivative notation

Section 3.3 Techniques of Differentiation

- Memorize and be able to apply differentiation rules for sums, differences, products, and quotients of functions
- Be able to use these differentiation rules to solve basic application problems
- Understand and be able to utilize the proofs of basic differentiation formulas

Section 3.4 Derivatives of Trigonometric Functions

- Memorize the differentiation formulas for the 6 basic trig functions
- Be able to equations for tangent lines to functions involving trigonometric expressions
- Know the proofs of trigonometric differentiation formulas (except $\sin x$ and $\cos x$)

Section 3.5 Increments and Differentials

- Understand the idea of linear approximation using increments
- Know the formulas for the increments of a function δy and the differential of a function dy
- Be able to use increments and differentials to find approximations.
- Be able to use increments and differentials to do error calculations and error estimates

Section 3.6 The Chain Rule

- Memorize the chain rule and be able to apply it to compute the derivative of composite functions
- Be able to Combine the chain rule with other differentiation techniques

Section 3.7 Implicit Differentiation

- Know the difference between implicit functions and explicit functions
- Be able to find the derivative of an implicit function
- Be able to find equations for tangent lines to points on implicit curves

Section 3.8 Related Rates

- Know the general method for solving related rates problems
- Understand the connection between related rates and implicit differentiation
- Use related rates to compute rates of change and to solve application problems