

Will's Guide To Life, Volume 2

Math 220

Spring 2009

Preliminaries

Remember that the work is more important than the final answer! There is a limit on time, so work hard and work efficiently, do not spend all of your time working any one problem. It is better to have studied too much and be over-prepared than to understudy and do poorly.

You will be expected to know the definitions and statements of the major results and ideas covered in lecture. You need to be able to state **all** hypotheses of the Theorems. Do not waste time simplifying expressions unless specifically directed to do so.

If you were unhappy with the result of Exam 1, learn from your mistakes and make sure you study more and more efficiently.

Section 2.1

Tangent lines as the limit of secant lines. Instantaneous velocity as the limit of average velocity on smaller and smaller intervals of time. The similarity between the formulas for the slope of the tangent line and instantaneous velocity.

Section 2.2

The derivative. The definition of the derivative and what it means to be differentiable. Calculating derivatives by calculating limits (all calculus comes back to limits!) Prime, Leibniz and “operator” notation for derivatives. The relationship between differentiability and continuity. Ways in which a function can fail to be differentiable.

Section 2.3

The Power Rule and the General Power Rule. How we can show the Power Rule is true with the Binomial Theorem. The General Derivative Rules, how they

are similar to the Limit Laws and how they are different. Higher order derivatives, how to calculate and notation. What higher order derivatives represent physically.

Section 2.4

Product Rule and Quotient Rules. (This is where derivative rules look different from the Limit Laws.) When you need to use these rules and when it will be easier to simplify the function first.

Section 2.5

The Chain Rule, how derivatives interact with composition of functions. The different ways to write the Chain Rule (these alternate ways of writing may help you remember it better.) Using the Chain Rule to calculate the derivative of inverse functions.

Section 2.6

Derivatives and trigonometric functions. The geometric machinery needed to calculate these derivatives and limits. The derivatives of all the trigonometric functions. (Can be derived from the derivatives of sine and cosine and the derivative rules.) Combining these derivatives with the other rules.

Section 2.7

Derivatives of Exponential and Logarithmic Functions. Why e is the preferred base of exponential and logarithmic functions. Finding the derivative of the natural logarithmic function by using inverse functions. Logarithmic differentiation.

Section 2.8

Implicit Differentiation. How to differentiate equations and relations that need not be functions. (This is just using the Chain Rule cleverly.) Using implicit differentiation to find the derivatives of the inverse trigonometric functions.

Section 2.9

The Mean Value Theorem. (This is a very important result, we will reuse it at the end of the semester in the most important theorem in the class!) Rolle's

Theorem, what it says and how it is used in the Mean Value Theorem. The different results that follow from Rolle's and the Mean Value Theorem.

Other Info

- The exam will test both your knowledge of the concepts and ideas presented as well as your ability to work problems.
- Remember that the right work is far more important than the right final answer.
- Be sure to clearly indicate your final answer to a problem by boxing or circling and labeling it as your final answer.
- The best way to study is to re-read your lecture notes and the book, work through the suggested homework problems and look over your graded work. Learn from the mistakes you have made on quizzes and homework, do not repeat them on the exam.

For more Math 220 related information, be sure to check the course website: www.math.uiuc.edu/~wgreen4/math220_spring09.html