Math 112J – Exam 1 Study Guide

1-26-12

Exam 1 will be given on Thursday 2/2, in class. You may use your calculator on the exam, but no books or notes. You may not share a calculator with another student on the exam; **if you want to use a calculator, you must bring your own.**

Exam 1 will cover the Chain Rule (Section 3.6) and Implicit Differentiation (Section 3.7). You may want to re-read these sections and make a list of the main points to be memorized. Then, work several problems each day to get your skills into tip-top shape. You can re-work problems from homework assignments and in-class discussion. You can also work similar problems in your textbook – all the odd-numbered exercises have answers in the back of the book.

We’ll have a review day in class on Tuesday 1/31. Bring specific problems you’d like us to go over in class that day.

Here are a few “sample” exam problems for you to practice on. (They are not meant to indicate *all* the possible types of questions on the exam!)

1. State the chain rule in Newton’s (prime) notation. Include the necessary hypotheses.
2. Suppose y is a function of u and u is a function of x. Use Liebniz’s (d) notation to show how you would find dy/dx, assuming it exists.
3. We defined implicit differentiation as a two-step process. Given an equation in x and y, what are the two steps required to find dy/dx by implicit differentiation?
4. Suppose . The graph of this equation is a curve in the x-y plane.
   1. Use implicit differentiation to find dy/dx. Show your steps clearly.
   2. Find an equation for the tangent line *L* to the curve at the point P(4,-1).
   3. Sketch a careful graph of the entire curve, showing the point P(4, -1) and the line *L* from part b.
5. Suppose . Use the chain rule and the following table to estimate .

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| *x* | 1.8 | 2.0 | 2.2 | 3.4 | 3.5 | 3.6 |
| *g*(*x*) | 3.3 | 3.5 | 3.6 | 5.3 | 4.9 | 4.3 |

1. Use the chain rule to find all the x-coordinates at which the graph of the given function has a horizontal tangent line. Show your work clearly.
   1. 
   2. 
   3. 
2. Use the chain rule and the product rule to give a proof of the quotient rule. Hint: Start by writing .