Mathematics 136, section 4 – AP Calculus
Information on Exam 1
September 24, 2003

General Information

The first exam for the course will be given next Tuesday, September 30, as announced in the course syllabus. It will cover the material discussed in class from the start of the semester *through and including* the material on parametric curves from Lab Day 2 and Wednesday, September 24. There will be 4 or 5 problems, some possibly with several parts. Some may ask for a graph or the result of a calculation; others may ask for a precise definition of a term or concept we have used, or a short description or explanation of some phenomenon (similar to the questions from Lab Day assignments).

Calculators

As announced in the course syllabus, I will be providing a basic scientific numerical calculator (TI model TI-30Xa) for you to use on this exam. These calculators can compute $+, -, \times, \div$ and values of all functions we have talked about, but have no graphing or symbolic computation features.

Review Session

If there is interest, I will be happy to schedule a review session outside of class time to help you get ready for the exam. I will be available any time after 3:00 pm on Monday, September 29 and also can arrange to be on campus the previous Saturday or Sunday if that would be more convenient. Start to prepare for the exam early, so that there will be time to address questions that might come up as you look at the review questions and sample exam below.

Suggested Practice Problems

From the text:

- Chapter 1 Review Problems: p. 48/1, 2, 6-17 (We did these on the first discussion; make sure you can do questions like this without a graphing calculator. There are similar questions in sections 2,5,6 in Chapter 1 if you want to try others too.) Also: 25, 29, 35.
- Chapter 2 Review Problems: p. 99/3,5,7,8 (for the last two of these, the directions mean: using the limit definition of the derivative). Also: 13-17, 26, 31 (we didn't talk about anything like this in class – see if you can figure out a method based on what we did talk about), 36
- Be able to differentiate any functions like p. 159/1 - 52 given by formulas (you don't need to do all of these; just make sure you can handle all the different functions involved, can spot which derivative rule(s) apply, etc. Also you might need to compute a derivative like one of these as part of a larger problem.)

- Be prepared for a question like 1 - 4 in Chapter 3, Section 8 (parametric curves).

Other sample exam questions:

- Imagine you are zooming in on the graphs of the following functions near the origin:

  a) $y = \sin(x) - \tan(x)$
  b) $y = e^x - 1$
  c) $y = \frac{x^2}{x^2+1}$
  d) $y = \frac{x}{x^2+1}$
  e) $y = \frac{x}{x+1}$
  f) $y = |x|$ (absolute value function).

  Which of them would eventually look the same? Which would look locally linear? For those that would look linear, find the equations of the lines you would see *without* carrying out the zooming process. (*Think of what we did in Lab day 1 to see the idea of this problem*).
- State the precise definition of the derivative of a function f at $x = a$. *Use the definition* to compute $f'(x)$ for $f(x) = 2x^2 - 4$ at a general x.
- A population of bacteria grows in a medium that can support no more than P_1 of bacteria. At time $t = 0$, the number of bacteria present is $P_0 < P_1$. The population grows more and more rapidly at first, but then the rate of growth decreases and the population approaches P_1, without exceeding it. A) Sketch a qualitative graph of the population of bacteria as a function of time that fits this description. B) Sketch a qualitative graph of the derivative of your population function.