Mathematics 136, section 4 – AP Calculus
Review Sheet for Exam 2
October 24, 2003

General Information

The second exam for the course will be given next Friday, October 31, as announced in the course syllabus. It will cover the material from Chapters 4 - 7 in the text that we have discussed starting from immediately before the first exam through and including the material from Friday October 24. There will be 4 or 5 problems, some possibly with several parts. The format will be similar to that of the first exam.

Topics to be Covered

1. Critical points, local maxima and minima, global maxima and minima on an interval. In this connection, I might ask you something concerning critical points of a family of curves (as in Lab 3).
2. Applied optimization problems.
3. Riemann sums, the definite integral of a function over an interval $[a, b]$. Be prepared to compute a Riemann sum for a particular function and a given number of subdivisions (small, of course!) Also know how to derive the exact value of a definite integral of a function cx + d by taking the limit of the Riemann sums.
4. The Fundamental Theorem of Calculus (know the statement of this theorem – both parts)
5. First applications of integrals: Total change of a function, areas, average values.
6. Methods of integration, including substitution, integration by parts, use of the table of integrals. (Note: In order to give you time to prepare on other topics for the exam, there will not be a problem set covering this last point before the exam.) The review problems from Chapter 7 of the text are an extremely good source of practice problems, though!

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. Unfortunately, my evening and late afternoon schedule is going to be very full next week – I am basically only available on Tuesday (October 28). If that time is not convenient, I would be willing to consider doing an in-class review Wednesday, October 29.

Suggested Practice Problems

From the text:

- From Section 4.5: 8, 11, 12, 14.

- From Review Problems for Chapter 4: 5,6,17 and 19 (ignore the part of the instructions on graphing),22,23,27,31,35
- From Review Problems for Chapter 5: 3,4,5,9-13,23,31
- From Review Problems for Chapter 6: be able to do "simple" integrals like 1-29 using basic rules, 37, 41, 43, 48, 49
- From Practice Integration problems at end of Chapter 7: look at a good sample of these and see if you can tell which method will apply.

Sample Exam – Note the real exam will contain different questions, even different types of questions. But the topics covered here are a representative sample, and the actual exam will be about this length.

I. Section 4.5 (page 202)/16

II. Terminology.

A. What is the definition of the definite integral of a function $f(x)$ over the interval $[a, b]$?

B. What does the Fundamental Theorem of Calculus say about definite integrals?

III. Review Problems for Chapter 5 (page 252)/1

IV. Review Problems for Chapter 6 (page 285)/47

V. Compute each of the following integrals (the table of integrals from the text will be provided, and you may use it for parts B,C,D if necessary).

A. Show that entry II.17 in the table of integrals is correct, using integration by parts.

B.
$$\int x^5 e^{3x^2}\, dx$$

C.
$$\int \cos(2x)(\sin(2x)+4)^{1/3}\, dx$$

D.
$$\int_2^4 \frac{x+3}{4x^2+4x-3}\, dx$$