Mathematics 126 – Calculus for Social Science 2
Things to Know – Final Exam
December 3, 2001

General Information

- The final exam will be given in our regular classroom 8:30am - 11:30am on Friday, December 7.
- This will be a *comprehensive exam* – it will cover all of the material from Chapters 6-10 of the text that we have studied this semester. See the detailed list of topics below.
- The final will be similar in format to the three full period midterm exams, but roughly twice as long.
- If you are well prepared and work steadily, it should be possible to complete the exam in about 2 hours. But you will have the full-three hour period to work on the exam if you need that much time.
- If there is interest, we could try to set up a review session during study week.

Topics to Be Covered

1) Antiderivatives by basic formulas like power rule, rule for exponentials, etc.
2) Antiderivatives by substitution
3) Applied problems where you need to compute an antiderivative and use it to answer another question (for instance, Section 6.1,/68, 69, Section 6.2/55, 57, etc.)
4) Definite integrals – be prepared to do a Riemann sum calculation with a small number of subintervals (say $n = 4, 5$), for a relatively simple function
5) The Fundamental Theorem of Calculus – know a precise statement of this. I will not ask for the full proof/justification we did in class, though.
6) Applications of definite integrals to average values of functions, area between curves.
7) Present and Future Value of income streams – know how to compute these with integrals in cases where the rate of income generation varies with time (not just the "annuity" formulas on pages 526 and 527, which assume a constant payment in each time period). The integral(s) might require the technique of integration by parts to evaluate.
8) Integration by parts
9) Integration with a table. Some of these will require some algebra, and/or a preliminary substitution before the appropriate table entry can be identified. I will make copies of the table of integrals from the text and distribute them with the exam sheet.
10) Numerical integration. Know how to use the Trapezoidal and Simpson's Rules to compute approximations to integrals, also know how to use the "error bounds" given in the box on page 576 of the text. (I'll put the formulas from page 576 on the sheet with the table of integrals, so you won't need to memorize them.)
11) Improper integrals

12) Differential equations. Know how to verify that given functions are solutions of differential equations, general solutions, particular solutions satisfying given initial conditions.
13) Separable differential equations. Know how to solve by separation of variables and integration.
14) Applications of separable differential equations –
15) Probability distributions of random variables (density functions) –
16) Expected value and standard deviation
17) Normal distributions and applications (I will provide a copy of the table of values of the function $F(z) = P(Z <= z)$ for the standard normal Z – mean 0, standard deviation 1 – from pages 900-901 of the text) for you to use on the exam. You should know the transformation formula for converting a normally distributed random variable with a different mean and standard deviation to the standard one.)
18) Functions of several variables, level curves, etc.
19) Partial derivatives.
20) Finding maxima/minima of functions of two variables – critical points, the second derivative test, applied story problems.
21) Constrained max/min problems and the method of Lagrange Multipliers.

Suggestions on How to Study

A) Reread your class notes and work through the examples we did in class – everything on the final will be very close to something we did along the way somewhere!
B) Also look at your graded problem sets and the write-ups from the group discussion days.
C) Look over your quizzes and exams, especially any questions you had difficulty with. Read the comments and corrections – they're there to help you figure out what you did wrong and how to solve the problem correctly. Consult the review sheets for the 3 exams for practice problems. (The 3 review sheets are posted on the course homepage if you have misplaced your copies.) *Everything on the final will be very close to something we did along the way somewhere!*
D) Look over the practice exams for the three full-period midterms.
E) Don't panic! There is a lot of material here, but not all that many key ideas.