Mathematics 134 – Intensive Calculus for Science 2
Exam 2 – Things To Know
March 19, 2001

General Information

As announced in the course syllabus, the second full-period midterm exam of the semester will be given in class on Friday, March 23. The format will be similar to that of the midterm exams last semester and Exam 1 this time. The exam will cover the material since the last 3xam (Quizzes 4, 5, 6), including the following material from Chapter 7, section 7, Chapter 8 sections 1,2, and the "Focus on Modeling" section at the end of Chapter 8:

1) Improper integrals (integrals over infinite intervals, and integrals of functions with discontinuities in the interval $[a, b]$) – be able to identify which kind of improper integral you have, and set up the appropriate limits to evaluate them/determine whether they converge or not
2) Integrals for computing volumes of solids with known cross-sections: $V = \int_a^b A(x)\,dx$, where $A(x)$ is the cross-section area function.
3) Volumes of solids of revolution – Note: This is a special case of 2.
4) Integrals for computing total mass/center of mass of wires and plates of given shapes, given the mass density function
5) Density functions of distributions, cumulative distribution function, median, mean.

A copy of the table of integrals from our text will be provided.

There will be a review for the exam in class on Thursday, March 22. I will also set up an evening session with Jodi Marani on Thursday for last minute questions.

Sample Exam

I. Two of the following three integrals are improper integrals. Say which are the improper ones, and evaluate those only.

A) $\int_0^\infty \frac{1}{9x^2+1}\,dx$

B) $\int_1^2 \frac{1}{x-7}\,dx$

C) $\int_2^4 \frac{1}{(x-2)^{3/4}}\,dx$

II. Let R be the region bounded by $y = x^2$, $y = 0$, $x = 0$ and $x = 1$.

A) Sketch the region.
B) Find the volume of the solid obtained if R is rotated about the x-axis.
C) Find the volume of the solid obtained if R is rotated about the line $y = 4$.

III. A hill with a circular base has height $z = 100e^{-r^2/10}$ meters above the surrounding ground level at all points r meters measured horizontally from the center of the base.

A) How could you subdivide the hill so that the height is roughly constant on each portion of the hill?
B) Use your idea from A to set up an integral giving the total volume of the hill above the surrounding ground level. Evaluate to find the volume.

IV. Let x be the radius in millimeters of raindrops during a storm. Suppose the density function $p(x)$ for x has $p(1) = .4$, is linear over the range $1 \leq x \leq 6$ and is zero everywhere else.

A) Find a formula for $p(x)$.
B) Plot the cumulative distribution function for the radius of the raindrops, $P(x)$.
C) What is the mean radius of the raindrops?

Also see Problem Sets 4,5, the last three quizzes, and the Review Problems from the ends of Chapters 7,8 in the text for other practice problems.