Math 55a: Honors Advanced Calculus and Linear Algebra
Handout #1 (18 September 2002): About Math 55

Topics We will begin with a study of *metric topology* and *(bi)linear algebra*. These are fundamental tools for much of modern mathematics; in the course of the year, we will use them mostly to develop a rigorous treatment of *differential and integral calculus* in several variables, and also to sample other topics such as *differential equations* and *Fourier analysis*.

Which math class? The syllabus for Math 25 is similar; Math 55 differs not so much in the choice of topics as in the level of exposition, and is intended for students with significant experience with and enthusiasm for abstract mathematics. The Mathematics Department offers these courses at separate hours so you can "shop" both, which you are strongly encouraged to do if you are at all unsure which class is better for you — it's the only way to make an informed choice. By special dispensation from the Registrar, you may switch between 25 and 55 without penalty for the first three weeks of the semester. NB: Each year several first-year students are tempted to skip 25/55 entirely and dive right into the upper-level undergraduate or graduate courses; we have found that in nearly all cases this temptation is best resisted.

Textbooks Sheldon Axler: *Linear Algebra Done Right* (Springer, 1996); Walter Rudin: *Principles of Mathematical Analysis* (McGraw-Hill, 1976). Both should now be available for purchase at the Coop. Rudin's classic text will also serve us for much of 55b.

Office Hours, etc. My office is Room 335 of the Science Center (right outside the math library on the 3rd floor), telephone #(49)5-4625; my e-mail address is `elkies@math`. Office hours: Thursdays, 3:00–4:30 (except Colloquium Thursdays, 3:00–4:00), or by appointment. The assistant for the course is Andrei Jorza (`jorza@fas`). Section time and place will be determined once the class roster has stabilized and we know what everybody's schedule is. Most handouts, problem sets, etc. will be posted on the Math 55 home page: `www.math.harvard.edu/~elkies/M55a.02`.

Grading Most of your grade (about $2/3$) will be based on weekly *problem sets*. Doing mathematics is the only reliable way to learn it, and most of the material in 55 cannot reasonably be done in the framework of a few-hour exam. (There may be one or two in-class quizzes that will test your recollection of basic concepts; such a quiz will count for at most the equivalent of one homework assignment.) A final take-home exam will account for most of the remaining $1/3$ of your grade, with class participation used mostly to decide borderline cases. Math 55 is *not* "graded on a curve"; I would be most delighted to find that every single student in the class has earned an A. (When I have taught 55 previously, most but not all students did earn A or A$-$.)

You are encouraged to discuss the course with other students, your CA and/or me. It is much easier to learn mathematics if you have other people who will help you test your understanding and overcome problems. It is fine to discuss homework problems with other students, but *you should always write your homework solutions out yourself in your own words.* For the final take-home exam you will be on your honor to work on your own. Homework and final exams may be (and usually are) hand-written; for Andrei's and my sake, and also for yours when reviewing your corrected homework sets, please write neatly. If your handwriting tends to indecipherability, consider writing in the much more easily legible BLOCK LETTERS, which (perhaps counterintuitively) takes about the same time as scrawling.

Note I'll have to miss at least one classes during the course of the term (to be announced in advance). If it's more than one, I'll make up the missed time in January during Reading Period.