MATHEMATICS FOR ECONOMISTS II
SPRING 2010

MAXWELL B. STINCHCOMBE

Organization

Basics: We meet Mondays and Wednesdays, from 9:30 a.m. to 11:00 a.m. in RAS 310. The unique number is 33848.

Reaching me: My office is BRB 2.118, phone number (512)475-8515, my e-mail address is `max.stinchcombe@gmail.com`. Office hours are Tuesdays and Thursdays, 2:00-3:00 p.m. and Mondays and Wednesdays, 11-11:45 a.m., though the undergraduate students have priority for the first of these times. You can also drop-in, and/or make an appointment.

Texts: The required textbook for this class is *An Introduction to Mathematical Analysis for Economic Theory and Econometrics* by D. Corbae, M. Stinchcombe, and J. Zeeman.[1] I strongly advise you to read the material once before we cover it in lecture and once afterward.

Evaluation: There will be homework assignments due every two weeks, consisting of about 15 problems of varying difficulties. I expect you to get most of the problems entirely correct. To facilitate this, you will have two weeks from when I return the assignments to you to re-work them. I encourage you to come talk to me or to talk to your colleagues about what is missing/incorrect. Learning to give correct and complete arguments is a crucial skill for research.

Background: I will assume that you have had the (equivalent of the) first semester of graduate micro, macro, prob-stats, and math for economists.

Topics: This course is meant as an introduction to the basic graduate mathematics that is used in essentially all advanced economic analysis. Though it may feel that the tools are central to your experience of this course, it is their usefulness that motivates me to teach this course, and I hope you come to appreciate these as well. We will see these tools used for the following.

(1) The basic one-factor growth model of resource economics.
(2) The existence of optima.
(3) The Theorem of the Maximum.
(4) The distance between distributions used in the CLT.

[1]The list of typographical errors so far identified is on my website.

(5) Approximations of functions for nonparametric regression.
(6) The Weak and the Strong Law of Large Numbers.
(7) Some 0-1 Laws.
(8) Nonatomic models of large populations.
(9) The L^p spaces, as models of securities, stocks, bonds.
(10) The duals of the L^p spaces, where the prices of securities, stocks, and bonds live.
(11) Conditional expectations and (regular) conditional probabilities, which form the basis of models of partial information.

Schedule

The intended schedule for the first third of the semester is given below. If needed, we will adjust it.

Week 1: Review of statements/sets, proofs, introduction to infinite sets, superstructures (Ch. 1, 2.10, and 2.13).

Week 2: The "real" line as a completion (Ch. 3).

Weeks 3 and 4: The basic continuity/compactness/completeness results (Ch. 4.1-8).

Weeks 5 and 6: The space of compact sets, spaces of continuous functions, spaces of distribution functions, beginnings of approximation theory (Ch. 6.1-5)