Eco200: Maths Crash Course

Bunche 3156, 10–11:30, Fall 2007
http://www.economics.utoronto.ca/board/teaching.html

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Description

The course has three purposes. First, it will provide a gentle introduction to UCLA, allowing you to meet your classmates and giving you time to acclimatise. Second, it is designed to bring you up to speed on the maths required in the fall quarter. For some students, it will serve simply as a refresher; for others, the material will be plugging a few gaps. Third, the course should provide a taster of the tools used by economists on a day–to–day basis. I hope you all make the most of the maths and stats departments at UCLA, and enroll in further courses.

Grading

This is an odd course. I will provide exercises corresponding to each topic, but these won't be marked. There will be a simple quiz at the end of the class (on Friday afternoon). I hope you all pass; otherwise, we will have weekly meetings during the fall term. The quiz will test material from classes 1-9 and will be closed book.

Some Books

- Riley, "Essential Microeconomics", Chaps 1–3 and Appendix. http://essentialmicroeconomics.com
- MasColell, Whinston and Green, "Microeconomic Theory", Appendix.
- Simon and Blume, "Mathematics for Economists".
- Chiang, "Fundamental Methods of Mathematical Economics".
- Vohra, "Advanced Mathematical Economics".
- Any undergrad analysis book. For example, Math 131 uses Rudin's "Principles of Mathematical Analysis", Third Edition.

Topics

1. Fundamentals.
    - Logic, sets, induction, functions.
2. Elementary Analysis
    - Sequences: limits, upper bounds, limsup.
    - Topology: metric spaces, Euclidean space, open sets, closed sets (sequence characterisation), compact sets (BolzanoWeierstrass).
    - Continuous functions: basic characterisations, extreme value theorem, intermediate value theorem, continuity of correspondences.
    - Derivatives: FOCs, SOCs, mean value theorem, Taylor's theorem.
    - Convex sets: separating hyperplane theorem, supporting hyperplane theorem.
    - Concave functions: main characterisations, characterisation of quasi–concave functions.
    - Implicit function theorem.
3. Static Optimisation
    - Unconstrained optimisation: necessary and sufficient conditions for local and global maxima.
    - Constrained optimisation: equality constraints, boundary constraints, general inequality constraints, necessary and sufficient conditions for maxima.
    - Comparative statics: envelope theorem, basic monotone comparative statics theorem.
4. Linear Algebra
    - Positive definiteness and determinant tests.
    - Matric Algebra: addition, multiplication, trace, inverse, determinant, eigenvalues.