PhD Course on Mathematics Modules: Correspondences and static optimization

Program outline

Correspondences

1. Definition and relation to functions; properties of correspondences; upper and lower inverse correspondences; lower and upper hemicontinuity of correspondences and connection to continuity of functions; characterization of continuity of correspondences (C 2.1.5,2.2.1,2.3.4; MWG M.H).

2. Fixed point of a function and a correspondence; Brouwer's and Kakutani's fixed point theorems; Nash equilibrium (C 2.4.4, MWG M.I).

3. Theorem of the Maximum (C 2.3.5).

Static Optimization

1. Unconstrained optimization: statement of the problem, necessary and sufficient conditions for the existence of local and global maxima (C 5.2 SB 17.1-5, MWG M.J).

2. Constrained optimization: statement of the problem. Equality constraints, existence results. Inequality constraints: Kuhn-Tucker Theorem (C 5.3, SB 18.1-7; MWG M.K).

3. Comparative statics: statement of the problem, envelope Theorems (C 6, 6.1; SB 19.2 MWG M.L).

Reference Books

MWG: *Microeconomic Theory,* A. Mas-Colell, M.D. Whinston and J. R. Green, Oxford University Press, 1995.

SB: *Mathematics for Economists,* C. P. Simon and L. Blume, W.W. Norton & Company, 1994

C: *Foundations of Mathematical Economics,* M. Carter, The MIT Press Cambridge, Massachusetts, 2001