

LTCC Intensive Course “Mathematical Game Theory”

Part 1 — Nash equilibria and topology

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These are references only. This file will be posted at
<http://www.maths.lse.ac.uk/Personal/stengel/ltcc/>
along with links to original papers if possible.

Introduction to games in strategic form: See “Game Theory Basics”, lecture notes by BvS, 2008,
<http://www.maths.lse.ac.uk/Courses/MA301/lectnotes.pdf>

This includes:

- Best response condition (mixed strategy is best response if and only if all pure strategies played with positive probability are best responses).
- How Nash’s Theorem is proved from Brouwer’s fixed point theorem. See also
- Nash, J. F. (1951), Non-cooperative games. *Annals of Mathematics* 54, 286–295.

The KKM lemma:

- Knaster, B., C. Kuratowski, and S. Mazurkiewicz (1929), Ein Beweis des Fixpunktsatzes für n -dimensionale Simplexe. *Fund. Math.* 14, 132–137.
<http://planetmath.org/encyclopedia/KKMLemma.html>

Sperner’s lemma proved combinatorially:

- Cohen, D. I. A. (1967), On the Sperner lemma. *J. Combinatorial Theory* 2, 585–587.

Simplicial subdivision via “monotone” simplices:

- Kuhn, H. W. (1960), Some combinatorial lemmas in topology. *IBM J. Res. Develop.* 4, 508–524.

The Kohlberg–Mertens structure theorem: Theorem 1, page 1021–1022 in

- Kohlberg, E., and J.-F. Mertens (1986), On the strategic stability of equilibria. *Econometrica* 54, 1003–1037.

Use of the structure theorem for equilibrium computation:

- Govindan, S., and R. Wilson (2003), A global Newton method to compute Nash equilibria. *Journal of Economic Theory* 110, 65–86.

The Lemke–Howson algorithm:

- B. von Stengel (2007), Equilibrium computation for two-player games in strategic and extensive form. Chapter 3, *Algorithmic Game Theory*, eds. N. Nisan, T. Roughgarden, E. Tardos, and V. Vazirani, Cambridge Univ. Press, Cambridge, 53–78.
<http://www.maths.lse.ac.uk/Personal/stengel/bvs-publ.html>