International School of Economics at Tbilisi State University

Syllabus for "Mathematics for Economists" 2009/2010 year

III Term. Calculus of Several Variables

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Reading
3. Lecture Notes.

Grades: midterm - 40%, homework - 10%, final exam - 50%.

Week 1. Sets and Maps
Sets, operations on sets: union, intersection, direct product.
Sequences, limit, convergence, accumulation points, properties of limits.
Open sets, closet sets, compact sets.
Functions $\mathbb{R}^n \to \mathbb{R}$, $\mathbb{R}^n \to \mathbb{R}^m$. Geometrical representation of functions: graphs, level sets, images. Special kinds of functions: linear, quadratic, polynomials, continuous.
General notions: map, domain, range, image, kernel, composition, injection, surjection, bijection.

Week 2. Euclidian spaces
Metric and norm.
Orderings, preference relations, utility function.
Week 3. Quadratic Forms
Quadratic forms, definiteness. Linear constraints, bordered matrices.

Week 4. Multivariable Calculus I

Week 5. Multivariable Calculus II
Chain rule. Directional derivatives. Gradient.
Functions $\mathbb{R}^n \to \mathbb{R}^m$. Jacobian.

Week 6. Implicit Functions
Inverse function theorem. Rank theorem.

Week 7. Unconstrained Optimization
Local and global extrema. First order conditions. Second order conditions. Global maxima and minima. Regression analysis.
Economical applications.