Jonathan M. Borwein and Adrian S. Lewis, *Convex Analysis and Nonlinear Optimization, Theory and Examples,* Canadian Mathematical Society (CMS) Books in Mathematics, Vol. 3, Springer-Verlag, New York Berlin Heidelberg, 2000, ISBN:0-387-98940-4.

The book is a concise account of convex analysis, its applications and extensions. It is aimed primarily at first-year graduate students, so that the treatment is restricted to Euclidean space, a framework equivalent, in fact, to the space $\mathbb{R}^n$, but the coordinate free notation, adopted by the authors, is more flexible and elegant. The proof techniques are chosen, whenever possible, in such a way that the extension to infinite dimensions be obvious for readers familiar with functional analysis (Banach space theory). Some of the challenges arising in infinite dimensions are discussed in Chapter 9, *Postscript: Infinite versus finite dimensions,* in which case the results involve deeper geometric properties of Banach spaces. The last section of this chapter contains notes on previous chapters, explaining which results extend to infinite dimension and which not, as well as sources where these extensions can be found.

The authors adopted a succint style, avoiding as much as possible complicated technical details, their goal being "to showcase a few memorable principles rather than to develop the theory to its limits". The book consists of short, self-contained sections, each followed by a rather extensive set of exercises grouped into three categories: examples that illustrate the ideas in the text or easy expansions of sketched proofs (no mark); important pieces of additional theory or more testing examples (marked by one asterisk); and longer, harder examples or peripheral theory (marked by two asterisks). Some bibliographical comments are also included along with these exercises, an approach which allow the authors to cover a large variety of topics. A good idea on the included material is given by the headings of the chapters and the presentation of some topics included in the main text or in exercises.

Ch. 1, *Background* - Euclidean spaces, symmetric matrices, in the main text, and Radstrom cancellation, recession cones, affine sets, inequalities for matrices, in exercises.

Ch. 2, *Inequality constraints* - optimality conditions, theorems of alternative, max-functions, in the main text, and nearest points, coercivity, Carathéodory's theorem, Kirchoff's law, Schur convexity, steepest descent, in exercises.

Ch. 3, *Fenchel duality* - subgradients and convex functions, the value function, the Fenchel conjugate, in the main text, and normal cones, Bregman distances, Log-convexity, Duffin's duality gap, Psenichnii-Rockafellar condition, order-convexity and order subgradients, symmetric Fenchel duality, in exercises.

Ch. 4, *Convex analysis* - continuity of convex functions, Fenchel biconjugation, Lagrangian duality, in the main text, and polars and polar calculus, extreme and exposed points, Pareto minimization, von Neumann minimax theorem, Kakutani's saddle point theorems, Fisher information function, in exercises.

Ch. 5, *Special cases* - polyhedral convex sets and functions, functions of eigenvalues, duality, convex process duality, in the main text, and polyhedral algebra, polyhedral cones, convex spectral functions, DC functions, normal cones, order epigraphs, multifunctions, in exercises.

Ch. 6, *Nonsmooth optimization* - generalized derivatives, regularity and strict differentiability, tangent cones, the limiting subdifferential, in the main text, and Dini derivatives and subdifferentials, mean value theorem, regularity and nonsmooth calculus, subdifferentials of eigenvalues, contingent and Clarke cones, Clarke's subdifferentials, in exercises.

Ch. 7, *Karush-Kuhn-Tucker theory* - metric regularity, the KKT theorem, metric regularity and the limiting subdifferential, second order conditions,in the main text, and Lipschitz extension, closure and Ekeland's principle, Liusternik theorem, Slater condition, Hadamard's inequality, Guignard optimality conditions, higher order conditions, in exercises.

Ch. 8, *Fixed points* - the Brouwer fixed point theorem, selection and the Kakutani-Fan fixed point theorem, variational inequalities, in the main text, and nonexpansive mappings and Browder-Kirk fixed point theorem, Knaster-Kuratowski-Mazurkiewicz principle, hairy ball theorem, hedgehod theorem, Borsuk-Ulam theorem, Michael's selection theorem, Hahn-Katetov-Dowker sandwich theorem, single-valuedness and maximal monotonicity, cuscos and variational inequalities, Fan minimax inequality, Nash equilibrium, Bolzano-Poincaré-Miranda intermediate value theorem, in exercises.

There is a chapter, Chapter 10, containing a list of named results and notation, organized by sections. Beside this, the book contains also an Index.

The bibliogarphy counts 168 items.

Written by two experts in optimization theory and functional analysis, the book is an ideal introductory teaching text for first-year graduate students. By the wealth of highly non-trivial exercises, many of which are guided, it can serve for self-study too.

Stefan Cobzaş