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Nota di contenuto	Preface; Acknowledgments; Contents; 1. Fourier-Motzkin elimination; 1.1 Linear inequalities; 1.2 Linear optimization using elimination; 1.3 Polyhedra; 1.4 Exercises; 2. Affine subspaces; 2.1 Definition and basics; 2.2 The affine hull; 2.3 Affine subspaces and subspaces; 2.4 Affine independence and the dimension of a subset; 2.5 Exercises; 3. Convex subsets; 3.1 Basics; Minkowski sum, dilation and the polar of a subset; 3.2 The convex hull; 3.3 Faces of convex subsets; Interlude: Integral points in convex subsets; 3.4 Convex cones; The recession cone; Finitely generated cones 3.5 Caratheodory's theorem3.6 The convex hull, simplicial subsets and Bland's rule; Non-cycling; 3.7 Exercises; 4. Polyhedra; 4.1 Faces of polyhedra; 4.2 Extreme points and linear optimization; 4.3 Weyl's theorem; 4.4 Farkas's lemma; 4.5 Three applications of Farkas's lemma; 4.5.1 Markov chains and steady states; 4.5.2 Gordan's theorem; 4.5.3 Duality in linear programming; 4.6 Minkowski's theorem; 4.7 Parametrization of polyhedra; 4.8 Doubly stochastic matrices: The Birkhoff polytope; 4.8.1 Perfect pairings and doubly stochastic matrices; 4.9 Exercises; 5. Computations with polyhedra 5.1 Extreme rays and minimal generators in convex cones5.2 Minimal generators of a polyhedral cone; 5.3 The double description method; 5.3.1 Converting from half space to vertex representation; 5.3.2 Converting from vertex to half space representation; 5.3.3 Computing the convex hull; 5.4 Linear programming and the simplex algorithm;

Sommario/riassunto

Based on undergraduate teaching to students in computer science, economics and mathematics at Aarhus University, this is an elementary introduction to convex sets and convex functions with emphasis on concrete computations and examples.Starting from linear inequalities and Fourier-Motzkin elimination, the theory is developed by introducing polyhedra, the double description method and the simplex algorithm, closed convex subsets, convex functions of one and several variables ending with a chapter on convex optimization with the Karush-Kuhn-Tucker conditions, duality and an interior point algori