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Kantor, Ida; Matoušek, Jiří; Šámal, Robert
Mathematics++. Selected topics beyond the basic courses.
Student Mathematical Library 75. Providence, RI: American Mathematical Society (AMS) (ISBN 978-1-4704-2261-5/pbk). xii, 343 p. (2015).

The book under review contains six chapters that can be read independently, each one surveying one mathematical topic. The authors present in a clear manner the basic notions, the basic results, examples, and the chapters also contains exercises left to the reader. The topics presented are the following: indent=6mm
– Measure and integral. The chapter also contains a section on the foundations of probability theory.
– Geometry in higher dimensions. The authors concentrate on phenomena which occur in dimensions ≥ 4 which contradict our geometric intuition in dimensions 2 and 3. Examples arise in discretization and convex geometry. The authors also make relations with the topic of the first chapter, and in particular with probability theory. Among others, the present chapter includes sections on Gaussian measure, measure concentration, the Brunn-Minkowski inequality and isoperimetry.
– Fourier analysis, including the Fourier transform and the Poisson summation formula. In particular, the authors discuss unexpected applications of the Fourier transform concerning linearity testing and arithmetic progressions.
- Representations of finite groups with an application in communication complexity and other fields.
– Polynomials in several variables. This chapter includes a short introduction to some basic results in algebraic geometry: the Schwartz-Zippel theorem with applications to polynomial identity testing, ideals and the Hilbert basis theorem, Bézout's inequality in all dimensions and the Nullstellensatz
– Topology. The topics include the Borsuk-Ulam theorem, non-embeddability results, homotopy and homology groups of simplicial complexes, simplicial approximations, and other theorems in algebraic geometry. The book arose from a course taught by the authors to PhD students in computer science and discrete mathematics. It is carefully written, and it is better than a collection of lecture notes. Such books are needed for students, as a complement to the standard textbooks and to present more specialized applications of classical mathematics. The reviewer wishes there were many more such books.

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Classification: H45 I45 I95 H35 H75 K15
Keywords: measure; integral; geometry concentration; representations of finite groups; varieties, Nullstellensatz; Bézout inequality; Hilbert basis; Borsuk-Ulam theorem; homotopy; homology