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Nota di contenuto	Preface -- Notation for Sets and Functions -- 1 Geometry, Algebra, and Algorithms -- 2 Groebner Bases -- 3 Elimination Theory -- 4 The Algebra-Geometry Dictionary -- 5 Polynomial and Rational Functions on a Variety -- 6 Robotics and Automatic Geometric Theorem Proving -- 7 Invariant Theory of Finite Groups -- 8 Projective Algebraic

Geometry -- 9 The Dimension of a Variety -- 10 Additional Groebner Basis Algorithms -- Appendix A Some Concepts from Algebra -- Appendix B Pseudocode -- Appendix C Computer Algebra Systems -- Appendix D Independent Projects -- References -- Index.

Sommario/riassunto

This text covers topics in algebraic geometry and commutative algebra with careful attention to their practical and computational aspects. The first four chapters form the core of the book. A comprehensive chart in the Preface illustrates a variety of ways to proceed with the material once these chapters are covered. In addition to the fundamentals of algebraic geometry—the elimination theorem, the extension theorem, the closure theorem and the Nullstellensatz—there are chapters on polynomial and rational functions between varieties, robotics and geometric theorem proving, invariant theory of finite groups, projective algebraic geometry, dimension theory, and progress made over the last decades in computing Gröbner bases. The fifth edition builds on the fourth edition in two main ways. First, a number of typographical errors, found by readers and by the authors since 2018, have been corrected. Second, new material on toric varieties, monomial curves, and other topics of current interest in algebraic geometry has been added. This enhances the opportunities for active learning through new examples, new exercises, and new projects in Appendix D, all supplemented by additional references. The book also includes updated computer algebra material in Appendix C. The book may be used for a first or second course in undergraduate abstract algebra and, with some augmentation perhaps, for beginning graduate courses in algebraic geometry or computational commutative algebra. Prerequisites for the reader include linear algebra and a proof-oriented course. It is assumed that the reader has access to a computer algebra system. Appendix C describes features of Maple™, Mathematica® and SageMath, as well as other systems that are most relevant to the text. Pseudocode is used in the text; Appendix B carefully describes the pseudocode used. From the reviews of previous editions: “…The book is well-written. …The reviewer is sure that it will be an excellent guide to introduce further undergraduates in the algorithmic aspect of commutative algebra and algebraic geometry.” —Peter Schenzel, zbMATH, 2007 “I consider the book to be wonderful. … The exposition is very clear, there are many helpful pictures and there are a great many instructive exercises, some quite challenging … offers the heart and soul of modern commutative and algebraic geometry.” —The American Mathematical Monthly.