Affine And Projective Geometry M K Benett

This concise classic presents advanced undergraduates and graduate students in mathematics with an overview of geometric algebra. The text originated with lecture notes from a New York University course taught by Emil Artin, one of the preeminent mathematicians of the twentieth century. The Bulletin of the American Mathematical Society praised Geometric Algebra upon its initial publication, noting that "mathematicians will find on many pages ample evidence of the author's ability to penetrate a subject and to present material in a particularly elegant manner." Chapter 1 serves as reference, consisting of the proofs of certain isolated algebraic theorems. Subsequent chapters explore affine and projective geometry, symplectic and orthogonal geometry, the general linear group, and the structure of symplectic and orthogonal groups. The author offers suggestions for the use of this book, which concludes with a bibliography and index.

The present monograph is a state-of-art survey of the geometry of matrices whose study was initiated by L K Hua in the forties. The geometry of rectangular matrices, of alternate matrices, of symmetric matrices, and of hermitian matrices over a division ring or a field are studied in detail. The author's recent results on geometry of symmetric matrices and of hermitian matrices are included. A chapter on linear algebra over a division ring and one on affine and projective geometry over a division ring are also

included. The book is clearly written so that graduate students and third or fourth year undergraduate students in mathematics can read it without difficulty.
The book consists of XI Parts and 28 Chapters covering all areas of mathematics. It is a tool for students, scientists, engineers, students of many disciplines, teachers, professionals, writers and also for a general reader with an interest in mathematics and in science. It provides a wide range of mathematical concepts, definitions, propositions, theorems, proofs, examples, and numerous illustrations. The difficulty level can vary depending on chapters, and sustained attention will be required for some. The structure and list of Parts are quite classical: I. Foundations of Mathematics, II. Algebra, III. Number Theory, IV. Geometry, V. Analytic Geometry, VI. Topology, VII .Algebraic Topology, VIII. Analysis, IX. Category Theory, X. Probability and Statistics, XI. Applied Mathematics. Appendices provide useful lists of symbols and tables for ready reference. The publisher’s hope is that this book, slightly revised and in a convenient format, will serve the needs of readers, be it for study, teaching, exploration, work, or research.
Richly detailed survey of the evolution of geometrical ideas and development of concepts of modern geometry: projective, Euclidean, and non-Euclidean geometry; role of geometry in Newtonian physics, calculus, relativity. Over 100 exercises with answers. 1966 edition.
This advanced textbook on linear algebra and geometry covers a wide range of

classical and modern topics. Differing from existing textbooks in approach, the work illustrates the many-sided applications and connections of linear algebra with functional analysis, quantum mechanics and algebraic and differential geometry. The subjects covered in some detail include normed linear spaces, functions of linear operators, the basic structures of quantum mechanics and an introduction to linear programming. Also discussed are Kahler's metic, the theory of Hilbert polynomials, and projective and affine geometries. Unusual in its extensive use of applications in physics to clarify each topic, this comprehensice volume should be of particular interest to advanced undergraduates and graduates in mathematics and physics, and to lecturers in linear and multilinear algebra, linear programming and quantum mechanics.
This book is the result of many years of research in Non-Euclidean Geometries and Geometry of Lie groups, as well as teaching at Moscow State University (1947- 1949), Azerbaijan State University (Baku) (1950-1955), Kolomna Pedagogical Col lege (1955-1970), Moscow Pedagogical University (1971-1990), and Pennsylvania State University (1990-1995). My first books on Non-Euclidean Geometries and Geometry of Lie groups were written in Russian and published in Moscow: Non-Euclidean Geometries (1955) [Ro1] , Multidimensional Spaces (1966) [Ro2] , and Non-Euclidean Spaces (1969) [Ro3]. In [Ro1] I considered non-Euclidean geometries in the broad sense, as geometry of simple Lie groups, since classical non-Euclidean geometries, hyperbolic and elliptic, are geometries of simple Lie groups of classes Bn and D , and

geometries of complex n and quaternionic Hermitian elliptic and hyperbolic spaces are geometries of simple Lie groups of classes An and en. [Ro1] contains an exposition of the geometry of classical real non-Euclidean spaces and their interpretations as hyperspheres with identified antipodal points in Euclidean or pseudo-Euclidean spaces, and in projective and conformal spaces. Numerous interpretations of various spaces different from our usual space allow us, like stereoscopic vision, to see many traits of these spaces absent in the usual space.

Geared toward upper-level undergraduates and graduate students, this text establishes that projective geometry and linear algebra are essentially identical. The supporting evidence consists of theorems offering an algebraic demonstration of certain geometric concepts. 1952 edition.

This book is a monograph on unitals embedded in ?nite projective planes. Unitals are an interesting structure found in square order projective planes, and numerous research articles constructing and discussing these structures have appeared in print. More importantly, there still are many open pr- lems, and this remains a fruitful area for Ph.D. dissertations. Unitals play an important role in ?nite geometry as well as in related areas of mathematics. For example, unitals play a parallel role to Baer s- planes when considering extreme values for the size of a blocking set in a square order projective plane (see Section 2.3). Moreover, unitals meet the upper bound for the number of absolute points of any polarity in a square order projective plane (see

Section 1.5). From an applications point of view, the linear codes arising from unitals have excellent technical properties (see 2 Section 6.4). The automorphism group of the classical unitalH =H(2,q) is 2-transitive on the points ofH, and so unitals are of interest in group theory. In the ?eld of algebraic geometry over ?nite ?elds,H is a maximal curve that contains the largest number of F -rational points with respect to its genus, 2 q as established by the Hasse-Weil bound.

Projective Geometry and Algebraic Structures focuses on the relationship of geometry and algebra, including affine and projective planes, isomorphism, and system of real numbers. The book first elaborates on euclidean, projective, and affine planes, including axioms for a projective plane, algebraic incidence bases, and self-dual axioms. The text then ponders on affine and projective planes, theorems of Desargues and Pappus, and coordination. Topics include algebraic systems and incidence bases, coordinatization theorem, finite projective planes, coordinates, deletion subgeometries, imbedding theorem, and isomorphism. The publication examines projectivities, harmonic quadruples, real projective plane, and projective spaces. Discussions focus on subspaces and dimension, intervals and complements, dual spaces, axioms for a projective space, ordered fields, completeness and the real numbers, real projective plane, and harmonic quadruples. The manuscript is a dependable reference for students and researchers interested in projective planes, system of real numbers, isomorphism, and subspaces and dimensions.

This richly illustrated and clearly written undergraduate textbook captures the excitement and beauty of geometry. The approach is that of Klein in his Erlangen programme: a geometry is a space together with a set of transformations of the space. The authors explore various geometries: affine, projective, inversive, hyperbolic and elliptic. In each case they carefully explain the key results and discuss the relationships between the geometries. New features in this second edition include concise end-of-chapter summaries to aid student revision, a list of further reading and a list of special symbols. The authors have also revised many of the end-of-chapter exercises to make them more challenging and to include some interesting new results. Full solutions to the 200 problems are included in the text, while complete solutions to all of the end-of-chapter exercises are available in a new Instructors' Manual, which can be downloaded from www.cambridge.org/9781107647831.

This book is a translation from Russian of Part II of the book Mathematics Through Problems: From Olympiads and Math Circles to Profession. Part I, Algebra, was recently published in the same series. Part III, Combinatorics, will be published soon. The main goal of this book is to develop important parts of mathematics through problems. The authors tried to put together sequences of problems that allow high school students (and some undergraduates) with strong interest in mathematics to discover and recreate much of elementary mathematics and start edging into more sophisticated topics such as projective and affine geometry, solid geometry, and so on, thus building a bridge between standard high school exercises and more intricate notions in geometry. Definitions and/or references for material that is not standard in the school curriculum are included. To help students that might be unfamiliar with new material, problems are carefully arranged to provide gradual introduction into each subject. Problems are often accompanied by hints and/or complete solutions. The book is based on classes taught by the authors at different times at the Independent University of Moscow, at a number of Moscow schools and math circles, and at various summer schools. It can be used by high school students and undergraduates, their teachers, and organizers of summer camps and math circles. In the interest of fostering a greater awareness and appreciation of mathematics and its connections to other disciplines and everyday life, MSRI and the AMS are publishing books in the Mathematical Circles Library series as a service to young people, their parents and teachers, and the mathematics profession.

Projective geometry is concerned with the properties of figures that are invariant by projecting and taking sections. It is considered one of the most beautiful parts of geometry and plays a central role because its specializations cover the whole of the affine, Euclidean and non-Euclidean geometries. The natural extension of projective geometry is projective algebraic geometry, a rich and active field of research. The results and techniques of projective geometry are intensively used in computer vision. This book contains a comprehensive presentation of projective geometry, over the real and complex number fields, and its applications to affine and Euclidean geometries. It covers central topics such as linear varieties, cross ratio, duality, projective transformations, quadrics and their classifications--projective, affine and metric--as well as the more advanced and less usual spaces of quadrics, rational normal curves, line complexes and the classifications of collineations, pencils of quadrics and correlations. Two appendices are devoted to the projective foundations of perspective and to the projective models of plane non-Euclidean geometries. The book uses modern language, is based on linear algebra, and provides complete proofs. Exercises are proposed at the end of each chapter; many of them are beautiful classical results. The material in this book is suitable for courses on projective geometry for undergraduate students, with a working knowledge of a standard first course on linear algebra. The text is a valuable guide to graduate students and researchers working in areas using or related to projective geometry, such as algebraic geometry and computer vision, and to anyone looking for an advanced view of geometry as a whole.

Geometry, this very ancient field of study of mathematics, frequently remains too little familiar to students. Michle Audin, professor at the University of Strasbourg, has written a book allowing them to remedy this situation and, starting from linear algebra, extend their knowledge of affine, Euclidean and projective geometry, conic sections and quadrics, curves and surfaces. It includes many nice theorems like the nine-point circle, Feuerbach's theorem, and so on. Everything is presented clearly and rigourously. Each property is proved, examples and exercises illustrate the course content perfectly. Precise hints for most of the exercises are provided at the end of the book. This very comprehensive text is addressed to students at upper undergraduate and Master's level to discover geometry and deepen their knowledge and understanding.

Frames, together with a modified fundamental construction, provide a powerful recursive mechanism for constructing resolvable balanced incomplete block designs (BIBDs). Frames and Resolvable Designs: Uses, Constructions and Existence presents a unique study of frames and their application to this construction. Chapter 1 sets the stage by describing the games combinatorialists play. It introduces basic combinatorial structures and construction techniques. Chapter 2 discusses frames extensively and includes comprehensive lists of direct and recursive constructions. Chapter 3 provides known classes of RBIBD constructions. Chapter 4 deals with existence results and demonstrates the utility of the frame approach. Chapter 5 is a series of informative tables useful for researchers. No other book tackles this demanding topic from these varied perspectives. Multi-faceted and written for easy access by different users, Frames and Resolvable Designs: Uses, Constructions and Existence is the right choice for students, as a text in advanced design theory; for researchers, as a resource complement to standard encyclopedic works; and for mathematicians and statisticians in this field, as a working handbook.

An ideal text for undergraduate courses in projective geometry, this volume begins on familiar ground. It starts by employing the leading methods of projective geometry as an extension of high school-level studies of geometry and algebra, and proceeds to more advanced topics with an axiomatic approach. An introductory chapter leads to discussions of projective geometry's axiomatic foundations: establishing coordinates in a plane; relations between the basic theorems; higher-dimensional space; and conics. Additional topics include coordinate systems and linear transformations; an abstract consideration of coordinate systems; an analytical treatment of conic sections; coordinates on a conic; pairs of conics; quadric surfaces; and the Jordan canonical form. Numerous figures illuminate the text.

A self-contained account suited for a wide audience describing coding theory, combinatorial designs and their relations.

Textbook for undergraduate courses on geometry or for self study that reveals the intricacies of geometry.

This accessible book for beginners uses intuitive geometric concepts to create abstract algebraic theory with a special emphasis on geometric characterizations. The book applies known results to describe various geometries and their invariants, and presents problems concerned with linear algebra, such as in real and complex analysis, differential equations, differentiable manifolds, differential geometry, Markov chains and transformation groups. The clear and inductive approach makes this book unique among existing books on linear algebra both in presentation and in content.

Grothendieck's beautiful theory of schemes permeates modern algebraic geometry and underlies its applications to number theory, physics, and applied mathematics. This simple account of that theory emphasizes and explains the universal geometric concepts behind the definitions. In the book, concepts are illustrated with fundamental examples, and explicit calculations show how the constructions of scheme theory are carried out in practice.

In Euclidean geometry, constructions are made with ruler and compass. Projective geometry is simpler: its constructions require only a ruler. In projective geometry one never measures anything, instead, one relates one set of points to another by a projectivity. The first two chapters of this book introduce the important concepts of the subject and provide the logical foundations. The third and fourth chapters introduce the famous theorems of Desargues and Pappus. Chapters 5 and 6 make use of projectivities on a line and plane, respectively. The next three chapters develop a self-contained account of von Staudt's approach to the theory of conics. The modern approach used in that development is exploited in Chapter 10, which deals with the simplest finite geometry that is rich enough to illustrate all the theorems nontrivially. The concluding chapters show the connections among projective, Euclidean, and analytic geometry.

Contains the Oxford Mathematical Institute notes for undergraduate and first-year postgraduates. The first half of the book covers groups, the second half covers geometry and both parts contain a number of exercises.

Projective geometry is one of the most fundamental and at the same time most beautiful branches of geometry. It can be considered the common foundation of many other geometric disciplines like Euclidean geometry, hyperbolic and elliptic geometry or even relativistic space-time geometry. This book offers a comprehensive introduction to this fascinating field and its applications. In particular, it explains how metric concepts may be best understood in projective terms. One of the major themes that appears throughout this book is the beauty of the interplay between geometry, algebra and combinatorics. This book can especially be used as a guide that explains how geometric objects and operations may be most elegantly expressed in algebraic terms, making it a valuable resource for mathematicians, as well as for

computer scientists and physicists. The book is based on the author’s experience in implementing geometric software and includes hundreds of high-quality illustrations.
An important new perspective on AFFINE AND PROJECTIVEGEOMETRY This innovative book treats math majors and math education studentsto a fresh look at affine and projective geometry from algebraic,synthetic, and lattice theoretic points of view. Affine and Projective Geometry comes complete with ninetyillustrations, and numerous examples and exercises, coveringmaterial for two semesters of upper-level undergraduatemathematics. The first part of the book deals with the correlationbetween synthetic geometry and linear algebra. In the second part,geometry is used to introduce lattice theory, and the bookculminates with the fundamental theorem of projectivegeometry. While emphasizing affine geometry and its basis in Euclideanconcepts, the book: * Builds an appreciation of the geometric nature of linear algebra * Expands students' understanding of abstract algebra with itsnontraditional, geometry-driven approach * Demonstrates how one branch of mathematics can be used to provetheorems in another * Provides opportunities for further investigation of mathematicsby various means, including historical references at the ends ofchapters Throughout, the text explores geometry's correlation to algebra inways that are meant to foster inquiry and develop mathematicalinsights whether or not one has a background in algebra. Theinsight offered is particularly important for prospective secondaryteachers who must major in the subject they teach to fulfill thelicensing requirements of many states. Affine and ProjectiveGeometry's broad scope and its communicative tone make it an idealchoice for all students and professionals who would like to furthertheir understanding of things mathematical.
This book starts with a concise but rigorous overview of the basic notions of projective

geometry, using straightforward and modern language. The goal is not only to establish the notation and terminology used, but also to offer the reader a quick survey of the subject matter. In the second part, the book presents more than 200 solved problems, for many of which several alternative solutions are provided. The level of difficulty of the exercises varies considerably: they range from computations to harder problems of a more theoretical nature, up to some actual complements of the theory. The structure of the text allows the reader to use the solutions of the exercises both to master the basic notions and techniques and to further their knowledge of the subject, thus learning some classical results not covered in the first part of the book. The book addresses the needs of undergraduate and graduate students in the theoretical and applied sciences, and will especially benefit those readers with a solid grasp of elementary Linear Algebra.

Metric Affine Geometry focuses on linear algebra, which is the source for the axiom systems of all affine and projective geometries, both metric and nonmetric. This book is organized into three chapters. Chapter 1 discusses nonmetric affine geometry, while Chapter 2 reviews inner products of vector spaces. The metric affine geometry is treated in Chapter 3. This text specifically discusses the concrete model for affine space, dilations in terms of coordinates, parallelograms, and theorem of Desargues. The inner products in terms of coordinates and similarities of affine spaces are also elaborated. The prerequisites for this publication are a course in linear algebra and an elementary course in modern algebra that includes the concepts of group, normal subgroup, and quotient group. This monograph is suitable for students and aspiring geometry high school teachers.

A textbook on projective geometry that emphasises applications in modern information and

communication science.
In this book we first review the ideas of Lie groupoid and Lie algebroid, and the associated concepts of connection. We next consider Lie groupoids of fibre morphisms of a fibre bundle, and the connections on such groupoids together with their symmetries. We also see how the infinitesimal approach, using Lie algebroids rather than Lie groupoids, and in particular using Lie algebroids of vector fields along the projection of the fibre bundle, may be of benefit. We then introduce Cartan geometries, together with a number of tools we shall use to study them. We take, as particular examples, the four classical types of geometry: affine, projective, Riemannian and conformal geometry. We also see how our approach can start to fit into a more general theory. Finally, we specialize to the geometries (affine and projective) associated with path spaces and geodesics, and consider their symmetries and other properties.
The first geometrical properties of a projective nature were discovered in the third century by Pappus of Alexandria. Filippo Brunelleschi (1404-1472) started investigating the geometry of perspective in 1425. Johannes Kepler (1571-1630) and Gerard Desargues (1591-1661) independently developed the pivotal concept of the "point at infinity." Desargues developed an alternative way of constructing perspective drawings by generalizing the use of vanishing points to include the case when these are infinitely far away. He made Euclidean geometry, where parallel lines are truly parallel, into a special case of an all-encompassing geometric system. Desargues's study on conic sections drew the attention of 16-years old Blaise Pascal and helped him formulate Pascal's theorem. The works of Gaspard Monge at the end of 18th and beginning of 19th century were important for the subsequent development of projective geometry. The work of Desargues was ignored until Michel Chasles chanced upon a

handwritten copy in 1845. Meanwhile, Jean-Victor Poncelet had published the foundational treatise on projective geometry in 1822. Poncelet separated the projective properties of objects in individual class and establishing a relationship between metric and projective properties. The non-Euclidean geometries discovered shortly thereafter were eventually demonstrated to have models, such as the Klein model of hyperbolic space, relating to projective geometry.
A basic problem in computer vision is to understand the structure of a real world scene given several images of it. Techniques for solving this problem are taken from projective geometry and photogrammetry. Here, the authors cover the geometric principles and their algebraic representation in terms of camera projection matrices, the fundamental matrix and the trifocal tensor. The theory and methods of computation of these entities are discussed with real examples, as is their use in the reconstruction of scenes from multiple images. The new edition features an extended introduction covering the key ideas in the book (which itself has been updated with additional examples and appendices) and significant new results which have appeared since the first edition. Comprehensive background material is provided, so readers familiar with linear algebra and basic numerical methods can understand the projective geometry and estimation algorithms presented, and implement the algorithms directly from the book.
The authors develop in detail the theory of (almost) c-projective geometry, a natural analogue of projective differential geometry adapted to (almost) complex manifolds. The authors realise it as a type of parabolic geometry and describe the associated Cartan or tractor connection. A Kähler manifold gives rise to a c-projective structure and this is one of the primary motivations for its study. The existence of two or more Kähler metrics underlying a given c-projective

structure has many ramifications, which the authors explore in depth. As a consequence of this analysis, they prove the Yano–Obata Conjecture for complete Kähler manifolds: if such a manifold admits a one parameter group of c-projective transformations that are not affine, then it is complex projective space, equipped with a multiple of the Fubini-Study metric.

Affine and Projective GeometryJohn Wiley & Sons

This monograph develops projective geometries and provides a systematic treatment of morphisms. It introduces a new fundamental theorem and its applications describing morphisms of projective geometries in homogeneous coordinates by semilinear maps. Other topics treated include three equivalent definitions of projective geometries and their correspondence with certain lattices; quotients of projective geometries and isomorphism theorems; and recent results in dimension theory.

Oriented Projective Geometry: A Framework for Geometric Computations proposes that oriented projective geometry is a better framework for geometric computations than classical projective geometry. The aim of the book is to stress the value of oriented projective geometry for practical computing and develop it as a rich, consistent, and effective tool for computer programmers. The monograph is comprised of 20 chapters. Chapter 1 gives a quick overview of classical and oriented projective geometry on the plane, and discusses their advantages and disadvantages as computational models. Chapters 2 through 7 define the canonical oriented projective spaces of arbitrary dimension, the operations of join and meet, and the concept of relative orientation. Chapter 8 defines projective maps, the space transformations that preserve incidence and orientation; these maps are used in chapter 9 to define abstract oriented projective spaces. Chapter 10 introduces the notion of projective duality. Chapters 11, 12, and 13 deal with projective functions, projective frames, relative coordinates, and cross-ratio. Chapter 14 tells about convexity in oriented projective spaces. Chapters 15, 16, and 17 show how the affine, Euclidean, and linear vector spaces can be emulated with the oriented projective space. Finally, chapters 18 through 20 discuss the computer representation and manipulation of lines, planes, and other subspaces. Computer scientists and programmers will find this text invaluable.

This is essentially a book on linear algebra. But the approach is somewhat unusual in that we emphasise throughout the geometric aspect of the subject. The material is suitable for a course on linear algebra for mathe matics majors at North American Universities in their junior or senior year and at British Universities in their second or third year. However, in view of the structure of undergraduate courses in the United States, it is very possible that, at many institutions, the text may be found more suitable at the beginning graduate level. The book has two aims: to provide a basic course in linear algebra up to, and including, modules over a principal ideal domain; and to explain in rigorous language the intuitively familiar concepts of euclidean, affine, and projective geometry and the relations between them. It is increasingly recognised that linear algebra should be approached from a geometric point of VIew. This applies not only to mathematics majors but also to mathematically-oriented natural scientists and engineers.

Elegant exposition of postulation geometry of planes offers rigorous, lucid treatment of coordination of affine and projective planes, set theory, propositional calculus, affine planes with Desargues and Pappus properties, more. 1961 edition.

This book formalizes and analyzes the relations between multiple views of a scene from the perspective of various types of geometries. A key feature is that it considers Euclidean and affine geometries as special cases of projective geometry. Over the last forty years, researchers have made great strides in elucidating the laws of image formation, processing, and understanding by animals, humans, and machines. This book describes the state of knowledge in one subarea of vision, the geometric laws that relate different views of a scene. Geometry, one of the oldest branches of mathematics, is the natural language for describing three-dimensional shapes and spatial relations. Projective geometry, the geometry that best models image formation, provides a unified framework for thinking about many geometric problems are relevant to vision. The book formalizes and analyzes the relations between multiple views of a scene from the perspective of various types of geometries. A key feature is that it considers Euclidean and affine geometries as special cases of projective geometry. Images play a prominent role in computer communications. Producers and users of images, in particular three-dimensional images, require a framework for stating and solving problems. The book offers a number of conceptual tools and theoretical results useful

for the design of machine vision algorithms. It also illustrates these tools and results with many examples of real applications.
There is a particular fascination when two apparently disjoint areas of mathematics turn out to have a meaningful connection to each other. The main goal of this book is to provide a largely self-contained, in-depth account of the linkage between nonassociative algebra and projective planes, with particular emphasis on octonion planes. There are several new results and many, if not most, of the proofs are new. The development should be accessible to most graduate students and should give them introductions to two areas which are often referenced but not often taught. On the geometric side, the book introduces coordinates in projective planes and relates coordinate properties to transitivity properties of certain automorphisms and to configuration conditions. It also classifies higher-dimensional geometries and determines their automorphisms. The exceptional octonion plane is studied in detail in a geometric context that allows nondivision coordinates. An axiomatic version of that context is also provided. Finally, some connections of nonassociative algebra to other geometries, including buildings, are outlined. On the algebraic side, basic properties of alternative algebras are derived, including the classification of alternative division rings. As tools for the study of the geometries, an axiomatic development of dimension, the basics of quadratic forms, a treatment of homogeneous maps and their polarizations, and a study of norm forms on hermitian matrices over composition algebras are

included.

This undergraduate text develops the geometry of plane and space, leading up to conics and quadrics, within the context of metrical, affine, and projective transformations. 1953 edition.

Geometry aims to describe the world around us. It is central to many branches of mathematics and physics, and offers a whole range of views on the universe. This is an introduction to the ideas of geometry and includes generous helpings of simple explanations and examples. The book is based on many years teaching experience so is thoroughly class-tested, and as prerequisites are minimal, it is suited to newcomers to the subject. There are plenty of illustrations; chapters end with a collection of exercises, and solutions are available for teachers.

Matroid theory is a vibrant area of research that provides a unified way to understand graph theory, linear algebra and combinatorics via finite geometry. This book provides the first comprehensive introduction to the field which will appeal to undergraduate students and to any mathematician interested in the geometric approach to matroids. Written in a friendly, fun-to-read style and developed from the authors' own undergraduate courses, the book is ideal for students. Beginning with a basic introduction to matroids, the book quickly familiarizes the reader with the breadth of the subject, and specific examples are used to illustrate the theory and to help students see matroids as more than just generalizations of graphs. Over 300 exercises are included, with many hints and solutions so students can test their understanding of the materials covered. The authors have also included several projects and open-ended research problems for independent study.