A Transition To Abstract Mathematics Second Edition Learning Mathematical Thinking And Writing

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Passage to Abstract Mathematics Waveland Press
Constructing concise and correct proofs is one of the most challenging aspects of learning to work with advanced mathematics. Meeting this challenge is a defining moment for those considering a career in mathematics or related fields. A Transition to Abstract Mathematics teaches readers to construct proofs and communicate with the precision necessary for working with abstraction. It is based on two premises: composing clear and accurate mathematical arguments is critical in abstract mathematics, and that this skill requires development and support. Abstraction is the destination, not the starting point. Maddox methodically builds toward a thorough understanding of the proof process, demonstrating and encouraging mathematical thinking along the way. Skillful use of analogy clarifies abstract ideas. Clearly presented methods of mathematical precision provide an understanding of the nature of mathematics and its defining structure. After mastering the art of the proof process, the reader may pursue two independent paths. The latter parts are purposefully designed to rest on the foundation of the first, and climb quickly into analysis or algebra. Maddox addresses fundamental principles in these two areas, so that readers can apply their mathematical thinking and writing skills to these new concepts. From this exposure, readers experience the beauty of the mathematical landscape and further develop their ability to work with abstract ideas. Covers the full

range of techniques used in proofs, including contrapositive, induction, and proof by contradiction Explains identification of techniques and how they are applied in the specific problem Illustrates how to read written proofs with many step by step examples Includes 20% more exercises than the first edition that are integrated into the material instead of end of chapter

An Elementary Transition to Abstract Mathematics Springer

Never HIGHLIGHT a Book Again Virtually all testable terms, concepts, persons, places, and events are included. Cram101 Textbook Outlines gives all of the outlines, highlights, notes for your textbook with optional online practice tests. Only Cram101 Outlines are Textbook Specific. Cram101 is NOT the Textbook. Accompanys: 9780521673761

Academic Press

This text is designed for students who are preparing to take a post-calculus abstract algebra and analysis course. Morash concentrates on providing students with the basic tools (sets, logic and proof techniques) needed for advanced study in mathematics. The first six chapters of the text are devoted to these basics, and these topics are reinforced throughout the remainder of the text. Morash guides students through the transition from a calculus-level courses upper-level courses that have significant abstract mathematical content.

Introductory Concepts for Abstract Mathematics CRC Press

Accessible but rigorous, this outstanding text encompasses all of the topics covered by a typical course in elementary abstract algebra. Its easy-to-read treatment offers an intuitive approach, featuring informal discussions followed by thematically arranged exercises. This second edition features additional exercises to improve student familiarity with applications. 1990 edition.

Mathematical Thinking and Writing

Springer Nature

This book is an introduction to the language and standard proof methods of mathematics. It is a bridge from the computational courses (such as calculus or differential equations) that students typically encounter in their first year of college to a more abstract outlook. It lays a foundation for more theoretical courses such as topology, analysis and abstract algebra. Although it may be more meaningful to the student who has had some calculus, there is really no prerequisite other than a measure of mathematical maturity.

Transition to Higher Mathematics Cram101

“Proofs and Fundamentals: A First Course in Abstract Mathematics” 2nd edition is designed as a "transition" course to introduce undergraduates to the writing of rigorous mathematical proofs, and to such fundamental mathematical ideas as sets, functions, relations, and cardinality. The text serves as a bridge between computational courses such as calculus, and more theoretical, proofs-oriented courses such as linear algebra, abstract algebra and real analysis. This 3-part work carefully balances Proofs, Fundamentals, and Extras. Part 1 presents logic and basic proof techniques; Part 2 thoroughly covers fundamental material such as sets, functions and relations; and Part 3 introduces a variety of extra topics such as groups, combinatorics and sequences. A gentle, friendly style is used, in which motivation and informal discussion play a key role, and yet high standards in rigor and in writing are never compromised. New to the second edition: 1) A new section about the foundations of set theory has been added at the end of the chapter about sets. This section includes a very informal discussion of the Zermelo–Fraenkel Axioms for set theory. We do not make use of these axioms subsequently in the text, but it is valuable for any mathematician to be aware that an axiomatic basis for set theory exists. Also included in this new section is a slightly expanded discussion of the Axiom of Choice, and new discussion of Zorn's Lemma, which is used later in the text. 2) The chapter about the cardinality of sets has been rearranged and expanded. There is a new section at the start of the chapter that summarizes various properties of the set of natural numbers; these properties play important roles subsequently in the chapter. The sections on induction and recursion have been slightly expanded, and have been relocated to an earlier place in the chapter (following the new section), both because they are more concrete than the material found in the other sections of the chapter, and because ideas from the sections on induction and recursion are used in the other sections. Next comes the section on the cardinality of sets (which was originally the first section of the chapter); this section gained proofs of the Schroeder–Bernstein theorem and the Trichotomy Law for Sets, and lost most of the material about finite and countable sets, which has now been moved to a new section devoted to those two types of sets. The chapter concludes with the section on the cardinality of the number systems. 3) The chapter on the construction of the natural numbers, integers and rational numbers from the Peano Postulates was removed entirely. That material was originally included to provide the needed background about the number systems, particularly for the discussion of the cardinality of sets, but it was always somewhat out of place given the level and scope of this text. The background material about the natural numbers needed for the cardinality of sets has now been summarized in a new section at the start of that chapter, making the chapter both self-contained and more accessible than it previously was. 4) The section on families of sets has been thoroughly revised, with the focus being on families of sets in general, not necessarily thought of as indexed. 5) A new section about the convergence of sequences has been added to the chapter on selected topics. This new section, which treats a topic from real analysis, adds some diversity to the chapter, which had hitherto contained selected topics of only an algebraic or combinatorial nature. 6) A new section called ``You Are the Professor'' has been added to the end of the last chapter. This new section, which includes a number of attempted proofs taken from actual homework exercises submitted by students, offers the reader the opportunity to solidify her facility for writing proofs by critiquing these submissions as if she were the instructor for the course. 7) All known errors have been corrected. 8) Many minor adjustments of wording have been made throughout the text, with the hope of improving the exposition.

An Introduction to Abstract Mathematics

Courier Corporation

This is an introductory textbook designed for undergraduate mathematics majors with an emphasis on abstraction and in particular, the concept of proofs in the setting of linear algebra. Typically such a student would have taken calculus, though the only prerequisite is suitable mathematical grounding. The purpose of this book is to bridge the gap between the more conceptual and computational oriented undergraduate classes to the more abstract oriented classes. The book begins with systems of linear equations and complex numbers, then relates these to the abstract notion of linear maps on finite-dimensional vector spaces, and covers diagonalization, eigenspaces, determinants, and the Spectral Theorem. Each chapter concludes with both proof-writing and computational exercises.

A Book of Abstract Algebra CRC Press

This text provides an introduction to the fundamental concepts and techniques used in abstract mathematics. It aims to guide students through the transition from more computational courses to higher level work by actively engaging them in the development of a central core of mathematical ideas.

Discovering Group Theory McGraw-Hill College

This book is designed for the sophomore/junior level Introduction to Advanced Mathematics course. Written in a modified R.L. Moore fashion, it offers a unique approach in which readers construct their own understanding. However, while readers are called upon to write their own proofs, they are also encouraged to work in groups. There are few finished proofs contained in the text, but the author offers “proof sketches” and helpful technique tips to help readers as they develop their proof writing skills. This book is most successful in a small, seminar style class. Logic, Sets, Induction, Relations, Functions, Elementary Number Theory, Cardinality, The Real Numbers For all readers interested in abstract mathematics.

An Introduction to Abstract Mathematics CRC Press

Provides a smooth and pleasant transition from first-year calculus to upper-level mathematics courses in real analysis, abstract algebra and number theory Most universities require students majoring in mathematics to take a “transition to higher math” course that introduces mathematical proofs and more rigorous thinking. Such courses help students be prepared for higher-level mathematics course from their onset. Advanced Mathematics: A Transitional Reference provides a “crash course” in beginning pure mathematics, offering instruction on a blendof inductive and deductive reasoning. By avoiding outdated methods and countless pages of theorems and proofs, this innovative textbook prompts students to think about the ideas presented in an enjoyable, constructive setting. Clear and concise chapters cover all the essential topics students need to transition from the "rote-orientated" courses of calculus to the more rigorous "proof-orientated” advanced mathematics courses. Topics include sentential and predicate calculus, mathematical induction, sets and counting, complex numbers, point-set topology, and symmetries, abstract groups, rings, and fields. Each section contains numerous problems for students of various interests and abilities. Ideally suited for a one-semester course, this book: Introduces students to mathematical proofs and rigorous thinking Provides thoroughly class-tested material from the authors own course in transitioning to higher math Strengthens the mathematical thought process of the reader Includes informative sidebars, historical notes, and plentiful graphics Offers a companion website to access a supplemental solutions manual for instructors Advanced Mathematics: A Transitional Reference is a valuable guide for undergraduate students who have taken courses in calculus, differential equations, or linear algebra, but may not be prepared for the more advanced courses of real analysis, abstract algebra, and number theory that await them. This text is also useful for scientists, engineers, and others seeking to refresh their skills in advanced math.

A Transition to Abstract Mathematics McGraw-Hill Education

Constructing concise and correct proofs is one of the most challenging aspects of learning to work with advanced mathematics. Meeting this challenge is a defining moment for those considering a career in mathematics or related fields. A Transition to Abstract Mathematics teaches readers to construct proofs and communicate with the precision necessary for working with abstraction. It is based on two premises: composing clear and accurate mathematical arguments is critical in abstract mathematics, and that this skill requires development and support. Abstraction is the destination, not the starting point. Maddox methodically builds toward a thorough understanding of the proof process, demonstrating and encouraging mathematical thinking along the way. Skillful use of analogy clarifies abstract ideas. Clearly presented methods of mathematical precision provide an understanding of the nature of mathematics and its defining structure. After mastering the art of the proof process, the reader may pursue two independent paths. The latter parts are purposefully designed to rest on the foundation of the first, and climb quickly into analysis or algebra. Maddox addresses fundamental principles in these two areas, so that readers can apply their mathematical thinking and writing skills to these new concepts. From this exposure, readers experience the beauty of the mathematical landscape and further develop their ability to work with abstract ideas. Covers the full range of techniques used in proofs, including contrapositive, induction, and proof by contradiction Explains identification of techniques and how they are applied in the specific problem Illustrates how to read written proofs with many step by step examples Includes 20% more exercises than the first edition that are integrated into the material instead of end of chapter

Student Solutions Manual for A Transition to Abstract Mathematics Springer Science & Business Media

A Transition to Proof: An Introduction to Advanced Mathematics describes writing proofs as a creative process. There is a lot that goes into creating a mathematical proof before writing it. Ample discussion of how to figure out the "nuts and bolts"' of the proof takes place: thought processes, scratch work and ways to attack problems. Readers will learn not just how to write mathematics but also how to do mathematics. They will then learn to communicate mathematics effectively. The text emphasizes the creativity, intuition, and correct mathematical exposition as it prepares students for courses beyond the calculus sequence. The author urges readers to work to define their mathematical voices. This is done with style tips and strict "mathematical do’s and don’ts", which are presented in eye-catching "text-boxes" throughout the text. The end result enables readers to fully understand the fundamentals of proof. Features: The text is aimed at transition courses preparing students to take analysis Promotes creativity, intuition, and accuracy in exposition The language of proof is established in the first two chapters, which cover logic and set theory Includes chapters on cardinality and introductory topology

Chapter Zero Addison-Wesley

Mathematical Proofs: A Transition to Advanced Mathematics, Third Edition, prepares students for the more abstract mathematics courses that follow calculus. Appropriate for self-study or for use in the classroom, this text introduces students to proof techniques, analyzing proofs, and writing proofs of their own. Written in a clear, conversational style, this book provides a solid introduction to such topics as relations, functions, and cardinalities of sets, as well as the theoretical aspects of fields such as number theory, abstract algebra, and group theory. It is also a great reference text that students can look back to when writing or reading proofs in their more advanced courses.

Foundations of Abstract Mathematics John Wiley & Sons

Developed for the "transition" course for mathematics majors moving beyond the primarily procedural methods of their calculus courses toward a more abstract and conceptual environment found in more advanced courses, A Transition to Mathematics with Proofs emphasizes mathematical rigor and helps students learn how to develop and write mathematical proofs. The author takes great care to develop a text that is accessible and readable for students at all levels. It addresses standard topics such as set theory, number system, logic, relations, functions, and induction in at a pace appropriate for a wide range of readers. Throughout early chapters students gradually become aware of the need for rigor, proof, and precision, and mathematical ideas are motivated through examples.

A Concise Introduction to Pure Mathematics American Mathematical Soc.

Student Solutions Manual for A Transition to Abstract MathematicsAcademic Press

Proofs and Fundamentals Pearson College Division

The purpose of this book is to prepare the reader for coping with abstract mathematics. The intended audience is both students taking a first course in abstract algebra who feel the need to strengthen their background and those from a more applied background who need some experience in dealing with abstract ideas. Learning any area of abstract mathematics requires not only ability to write formally but also to think intuitively about what is going on and to describe that process clearly and cogently in ordinary English. Ash tries to aid intuition by keeping proofs short and as informal as possible and using concrete examples as illustration. Thus, it is an ideal textbook for an audience with limited experience in formalism and abstraction. A number of expository innovations are included, for example, an informal development of set theory which teaches students all the basic results for algebra in one chapter.

Chapter Zero CRC Press

A Bridge to Abstract Mathematics will prepare the mathematical novice to explore the universe of abstract mathematics. Mathematics is a science that concerns theorems that must be proved within the constraints of a logical system of axioms and definitions rather than theories that must be tested, revised, and retested. Readers will learn how to read mathematics beyond popular computational calculus courses. Moreover, readers will learn how to construct their own proofs. The book is intended as the primary text for an introductory course in proving theorems, as well as for self-study or as a reference. Throughout the text, some pieces (usually proofs) are left as exercises. Part V gives hints to help students find good approaches to the exercises. Part I introduces the language of mathematics and the methods of proof. The mathematical content of Parts II through IV were chosen so as not to seriously overlap the standard mathematics major. In Part II, students study sets, functions, equivalence and order relations, and cardinality. Part III concerns algebra. The goal is to prove that the real numbers form the unique, up to isomorphism, ordered field with the least upper bound. In the process, we construct the real numbers starting with the natural numbers. Students will be prepared for an abstract linear algebra or modern algebra course. Part IV studies analysis. Continuity and differentiation are considered in the context of time scales (nonempty, closed subsets of the real numbers). Students will be prepared for advanced calculus and general topology courses. There is a lot of room for instructors to skip and choose topics from among those that are presented.

Sets, Functions, and Logic CRC Press

Mathematical Proofs: A Transition to Advanced Mathematics, 2/e, prepares students for the more abstract mathematics courses that follow calculus. This text introduces students to proof techniques and writing proofs of their own. As such, it is an introduction to the mathematics enterprise, providing solid introductions to relations, functions, and cardinalities of sets. KEY TOPICS: Communicating Mathematics, Sets, Logic, Direct Proof and Proof by Contrapositive, More on Direct Proof and Proof by Contrapositive, Existence and Proof by Contradiction, Mathematical Induction, Prove or Disprove, Equivalence Relations, Functions, Cardinalities of Sets, Proofs in Number Theory, Proofs in Calculus, Proofs in Group Theory. MARKET: For all readers interested in advanced mathematics and logic.

An Elementary Transition to Abstract Mathematics Addison-Wesley Longman

The author’s goal is a rigorous presentation of the fundamentals of analysis, starting from elementary level and moving to the advanced coursework. The curriculum of all mathematics (pure or applied) and physics programs include a compulsory course in mathematical analysis. This book will serve as can serve a main textbook of such (one semester) courses. The book can also serve as additional reading for such courses as real analysis, functional analysis, harmonic analysis etc. For non-math major students requiring math beyond calculus, this is a more friendly approach than many math-centric options. Friendly and well-rounded presentation of pre-analysis topics such as sets, proof techniques and systems of numbers. Deeper discussion of the basic concept of convergence for the system of real numbers, pointing out its specific features, and for metric spaces Presentation of Riemann integration and its place in the whole integration theory for single variable, including the Kurzweil-Henstock integration Elements of multiplicative calculus aiming to demonstrate the non-absoluteness of Newtonian calculus.

Proofs and Fundamentals Pearson College Division

Bond and Keane explicate the elements of logical, mathematical argument to elucidate the meaning and importance of mathematical rigor. With definitions of concepts at their disposal, students learn the rules of logical inference, read and understand proofs of theorems, and write their own proofs all while becoming familiar with the grammar of mathematics and its style. In addition, they will develop an appreciation of the different methods of proof (contradiction, induction), the value of a proof, and the beauty of an elegant argument. The authors emphasize that mathematics is an ongoing, vibrant disciplineits long, fascinating history continually intersects with territory still uncharted and questions still in need of answers. The authors extensive background in teaching mathematics shines through in this balanced, explicit, and engaging text, designed as a primer for higher- level mathematics courses. They elegantly demonstrate process and application and recognize the byproducts of both the achievements and the missteps of past thinkers. Chapters 1-5 introduce the fundamentals of abstract mathematics and chapters 6-8 apply the ideas and techniques, placing the earlier material in a real context. Readers interest is continually piqued by the use of clear explanations, practical examples, discussion and discovery exercises, and historical comments.