

basic mathematics by serge lang

Basic Mathematics by Serge Lang: A Timeless Approach to Mathematical Foundations

basic mathematics by serge lang is a phrase that resonates deeply with students, educators, and math enthusiasts seeking a clear and rigorous introduction to fundamental mathematical concepts. Serge Lang, a renowned mathematician and professor, authored this classic text to bridge the gap between elementary arithmetic and more advanced mathematical thinking. His book has helped countless learners develop a solid grasp of essential topics, enabling them to confidently tackle higher-level mathematics.

If you're exploring foundational math materials or want to understand why Serge Lang's approach remains influential, this article walks you through the core aspects of Basic Mathematics by Serge Lang. We'll delve into its unique style, key topics covered, and tips for getting the most out of this resource.

Understanding the Essence of Basic Mathematics by Serge Lang

Serge Lang's Basic Mathematics isn't just another textbook; it's a carefully crafted guide that emphasizes clarity, logical progression, and conceptual understanding. Unlike many introductory math books that focus heavily on rote procedures, Lang's work encourages readers to think critically about why mathematical rules exist and how different concepts interconnect.

At its heart, the book aims to build a strong foundation in arithmetic, algebra, geometry, and other fundamental areas. Lang's writing style is precise but accessible, making complex ideas approachable without oversimplifying. This balance is what sets the book apart and why it's often recommended for self-study or supplementary learning.

The Author Behind the Book: Serge Lang

Before diving deeper, it's worth appreciating who Serge Lang was. A prolific mathematician, Lang contributed extensively to number theory and algebraic geometry. Beyond his research, he was passionate about education and wrote many textbooks aimed at demystifying mathematics. His works have influenced generations of students worldwide.

Lang's focus on rigor and understanding reflects his belief that mathematics should be both beautiful and logical. Basic Mathematics is a testament to this philosophy, providing a pathway from elementary concepts to more abstract reasoning.

Key Topics Covered in Basic Mathematics by Serge

Lang

The scope of Basic Mathematics is impressive, covering a wide range of essential topics that form the building blocks for advanced study. Here's an overview of some major areas the book addresses:

1. Number Systems and Arithmetic

The book starts with the very basics—integers, rational numbers, and real numbers—explaining their properties and operations. Lang carefully introduces the laws of arithmetic, such as associativity, commutativity, and distributivity, laying the groundwork for algebraic manipulation.

Understanding these number systems is crucial because they underpin virtually all mathematical reasoning. Lang's treatment helps readers not just perform calculations but appreciate the structure behind them.

2. Algebraic Fundamentals

Moving beyond arithmetic, Basic Mathematics explores algebraic expressions, equations, and inequalities. Lang emphasizes solving linear and quadratic equations, manipulating polynomials, and understanding functions.

This section is particularly valuable for learners as it bridges concrete calculations with abstract thinking, preparing students for calculus and beyond.

3. Geometry and Trigonometry

Geometry is introduced with a focus on Euclidean principles, including properties of triangles, circles, and polygons. Lang also covers coordinate geometry, which connects algebra with geometric visualization.

Trigonometric functions and their applications are explained clearly, providing essential tools for solving problems involving angles and periodic phenomena.

4. Functions and Graphs

Understanding functions is a cornerstone of modern mathematics, and Lang dedicates significant attention to this topic. He explains different types of functions, graphing techniques, and transformations, helping readers visualize mathematical relationships.

This approach makes it easier to grasp more advanced concepts like limits and derivatives later on.

Why Basic Mathematics by Serge Lang Remains Relevant Today

Despite being first published decades ago, Lang's Basic Mathematics continues to be a go-to resource for several reasons:

- **Clear Explanations:** Lang's ability to break down complex ideas into understandable parts remains unmatched.
- **Logical Structure:** The book's organization mirrors the natural progression of learning, ensuring readers build on solid foundations.
- **Focus on Understanding:** Rather than memorizing formulas, Lang encourages deep comprehension, which is essential for success in advanced studies.
- **Self-Study Friendly:** The text is suitable for independent learners thanks to its thorough explanations and exercises.

Tips for Studying Basic Mathematics by Serge Lang

To maximize your learning experience with this book, consider these strategies:

1. **Take Your Time:** Don't rush through chapters. The book's depth means it's better digested slowly.
2. **Work Through Exercises:** Practice problems are key to internalizing concepts. Attempt them regularly.
3. **Review Key Concepts:** Periodically revisit earlier sections to reinforce foundational ideas.
4. **Supplement with Visual Aids:** Use graphs, diagrams, or online tools to enhance understanding, especially for geometry and functions.
5. **Discuss with Peers:** Explaining concepts to others can solidify your grasp and uncover gaps in knowledge.

Comparing Basic Mathematics by Serge Lang to Other Introductory Texts

When choosing a foundational math book, you may encounter several options. What sets Basic Mathematics apart is its combination of rigor and accessibility. Many introductory books either oversimplify or dive too quickly into advanced topics, but Lang strikes a balance that suits a broad audience.

Compared to typical high school textbooks, Lang's work offers deeper explanations and a stronger emphasis on proofs and logical reasoning. This makes it particularly useful for students planning to pursue mathematics or related fields at the university level.

Complementary Resources to Enhance Learning

While Basic Mathematics by Serge Lang is comprehensive, pairing it with other materials can enrich your study. For example:

- **Online Video Lectures:** Visual explanations can clarify challenging concepts.
- **Problem-Solving Books:** Additional exercise collections can provide varied practice.
- **Mathematical Forums:** Engaging with communities like Stack Exchange allows you to ask questions and share insights.

How Basic Mathematics by Serge Lang Builds Confidence in Mathematics

One of the most rewarding outcomes of studying Lang's book is the boost in mathematical confidence. By mastering the basics thoroughly, learners find themselves better equipped to approach complex problems without intimidation.

The emphasis on understanding "why" rather than just "how" creates a mindset that values reasoning and exploration. This not only aids academic success but also fosters an appreciation for the elegance of mathematics.

Whether you're a student preparing for higher education, a teacher seeking to improve your curriculum, or a lifelong learner, Basic Mathematics by Serge Lang offers a timeless foundation that supports mathematical growth.

In the landscape of educational books, Lang's Basic Mathematics shines as a beacon of clarity and depth, guiding readers through the beautiful world of numbers, shapes, and logical thinking.

Frequently Asked Questions

What topics are covered in Serge Lang's 'Basic Mathematics'?

Serge Lang's 'Basic Mathematics' covers fundamental topics including arithmetic, algebra, geometry, trigonometry, and introductory concepts in calculus and number theory.

Is 'Basic Mathematics' by Serge Lang suitable for beginners?

Yes, 'Basic Mathematics' is designed for high school students and beginners who want a thorough understanding of essential mathematical concepts before advancing to higher mathematics.

How does Serge Lang's approach in 'Basic Mathematics' differ from other textbooks?

Serge Lang emphasizes understanding mathematical concepts deeply through clear explanations, rigorous proofs, and numerous exercises, making the book both comprehensive and accessible.

Are there exercises included in 'Basic Mathematics' by Serge Lang?

Yes, the book includes a wide range of exercises at the end of each chapter to reinforce concepts and develop problem-solving skills.

Can 'Basic Mathematics' by Serge Lang be used for self-study?

Absolutely, the book is well-suited for self-study due to its clear explanations, structured progression, and detailed solutions to exercises.

Does 'Basic Mathematics' by Serge Lang include historical context for mathematical concepts?

While primarily focused on mathematics itself, the book occasionally references historical context to provide background and enhance understanding.

What level of mathematical background is recommended before reading 'Basic Mathematics'?

No advanced background is required; a basic familiarity with arithmetic and an eagerness to learn is sufficient to start with this book.

Is 'Basic Mathematics' by Serge Lang still relevant for learning math today?

Yes, the fundamental concepts covered in 'Basic Mathematics' remain essential and the clear, rigorous approach makes it a valuable resource even today.

Are there translations or editions of 'Basic Mathematics' by Serge Lang available globally?

Yes, 'Basic Mathematics' has been translated into multiple languages and is widely available in various editions around the world to support diverse learners.

Additional Resources

Basic Mathematics by Serge Lang: An In-Depth Review and Analysis

basic mathematics by serge lang is a foundational textbook that has garnered considerable attention for its clear exposition and rigorous approach to essential mathematical concepts. Serge Lang, a renowned mathematician and a prolific author of numerous textbooks, has crafted this work to address the needs of students and educators seeking a thorough introduction to the fundamentals of mathematics. This review explores the book's structure, pedagogical style, and relevance in today's educational landscape, while also situating it within the broader context of mathematics learning and instruction.

Overview of Basic Mathematics by Serge Lang

Basic Mathematics by Serge Lang is designed primarily as a preparatory text for students who intend to delve deeper into advanced mathematics. Unlike many introductory books that focus solely on arithmetic or elementary algebra, Lang's approach is comprehensive, covering a wide range of topics that build a solid foundation for further study. The book spans subjects such as arithmetic, algebra, geometry, and introduces the concept of functions and coordinate geometry, all presented with Lang's characteristic precision and clarity.

One of the standout features of this textbook is its commitment to logical development and conceptual understanding. Lang does not merely present formulas and procedures; instead, he emphasizes the reasoning behind mathematical truths. This method helps learners develop critical thinking skills alongside computational proficiency, which is essential for mastering higher-level mathematics.

Target Audience and Pedagogical Approach

Basic Mathematics by Serge Lang is suited for high school students preparing for college-level courses, adult learners revisiting mathematics, or even educators looking for a reliable resource to supplement their teaching. The book is structured to facilitate self-study, with carefully crafted exercises that reinforce key concepts without overwhelming the reader.

Lang's pedagogical style is both rigorous and approachable. He avoids overly technical jargon where possible, making complex ideas accessible without diluting their substance. This balance is crucial in a foundational text, as it encourages learners to engage deeply with the material rather than passively memorizing procedures.

Content Analysis: Strengths and Areas for Improvement

When analyzing basic mathematics by serge lang, several strengths emerge that justify its continued popularity. The clarity of explanations, logical progression of topics, and well-thought-out exercises contribute to an effective learning experience.

Strengths

- **Comprehensive Coverage:** The book covers a broad spectrum of basic mathematical topics, providing a unified treatment that links arithmetic, algebra, and geometry.
- **Logical Structure:** Topics are introduced in a sequence that aligns with natural learning progression, facilitating cumulative understanding.
- **Emphasis on Understanding:** Lang focuses on the 'why' and 'how' behind mathematical operations, which helps develop analytical skills.
- **Exercise Variety:** The exercises range from straightforward drills to problems requiring creative application, catering to different learning styles.

Areas for Improvement

Despite its many merits, the text has some limitations, particularly from the perspective of modern learners and educators.

- **Density of Content:** Some readers may find the material dense, as Lang's writing assumes a certain level of mathematical maturity.
- **Lack of Visual Aids:** Compared to contemporary textbooks, this work contains relatively few diagrams or visual illustrations, which can challenge visual learners.
- **Limited Real-World Applications:** The book focuses heavily on theoretical understanding, with fewer examples demonstrating practical applications.

Comparisons with Other Basic Mathematics Textbooks

When compared with other popular basic mathematics textbooks, such as those by authors like Richard Rusczyk or the "Basic Mathematics" edition by McGraw-Hill, Serge Lang's work stands out for its rigor and depth. While some texts prioritize accessibility and integration of technology, Lang's

book remains firmly rooted in classical methods and logical reasoning.

This difference makes basic mathematics by serge lang particularly appealing to students who aim to pursue pure mathematics or theoretical disciplines. Conversely, learners seeking a more application-driven or interactive approach might find other resources more immediately engaging.

Unique Features of Serge Lang's Approach

- **Mathematical Precision:** Lang's background as a professional mathematician ensures that the book maintains a high standard of accuracy.
- **Integration of Algebra and Geometry:** The seamless transition between these topics helps illustrate the interconnectedness of mathematical concepts.
- **Focus on Fundamental Concepts:** Rather than overwhelming readers with advanced topics, Lang concentrates on building a strong conceptual base.

Impact and Relevance in Contemporary Mathematics Education

In an era where digital tools and multimedia resources dominate education, basic mathematics by serge lang maintains relevance through its foundational rigor. The book's emphasis on logical reasoning and comprehensive coverage equips learners with skills that transcend rote memorization or procedural learning.

Educators often recommend this text for students who struggle with conceptual understanding or those preparing for competitive examinations requiring a strong grasp of fundamental mathematics. Furthermore, its suitability for self-study makes it a valuable resource in diverse educational settings, including homeschooling and adult education.

Integration with Modern Learning Tools

While the book itself is traditional in format, it can be effectively complemented by modern technologies. Educators and students can pair the text with online platforms offering interactive problem-solving, video tutorials, and graphical representations to address the book's relative lack of visual aids.

This hybrid approach enables learners to benefit from Lang's clear explanations and logical structure while engaging more dynamically with the material.

Conclusion: The Enduring Value of Basic Mathematics by Serge Lang

basic mathematics by serge lang continues to be a respected resource for those seeking a serious and comprehensive introduction to foundational mathematics. Its strength lies in the clarity of presentation, depth of content, and focus on understanding rather than memorization. While it may not cater to every learning style, especially in the context of today's diverse educational tools, its rigorous approach remains invaluable for building a strong mathematical foundation.

For students and educators committed to depth and precision, Serge Lang's basic mathematics offers a timeless guide that prepares learners not only for advanced study but also for cultivating a disciplined mathematical mindset.

Basic Mathematics By Serge Lang

basic mathematics by serge lang: Basic Mathematics Serge Lang, 1998-09-01 This text in basic mathematics is ideal for high school or college students. It provides a firm foundation in basic principles of mathematics and thereby acts as a springboard into calculus, linear algebra and other more advanced topics. The information is clearly presented, and the author develops concepts in such a manner to show how one subject matter can relate and evolve into another.

basic mathematics by serge lang: Geometry Serge Lang, Gene Murrow, 1988-08-25 From the reviews: A prominent research mathematician and a high school teacher have combined their efforts in order to produce a high school geometry course. The result is a challenging, vividly written volume which offers a broader treatment than the traditional Euclidean one, but which preserves its pedagogical virtues. The material included has been judiciously selected: some traditional items have been omitted, while emphasis has been laid on topics which relate the geometry course to the mathematics that precedes and follows. The exposition is clear and precise, while avoiding pedantry. There are many exercises, quite a number of them not routine. The exposition falls into twelve chapters: 1. Distance and Angles.- 2. Coordinates.- 3. Area and the Pythagoras Theorem.- 4. The Distance Formula.- 5. Some Applications of Right Triangles.- 6. Polygons.- 7. Congruent Triangles.- 8. Dilatations and Similarities.- 9. Volumes.- 10. Vectors and Dot Product.- 11. Transformations.- 12. Isometries. This excellent text, presenting elementary geometry in a manner fully corresponding to the requirements of modern mathematics, will certainly obtain well-merited popularity.

Publicationes Mathematicae Debrecen#1

basic mathematics by serge lang: Introduction to Arakelov Theory Serge Lang, 2012-12-06 Arakelov introduced a component at infinity in arithmetic considerations, thus giving rise to global theorems similar to those of the theory of surfaces, but in an arithmetic context over the ring of integers of a number field. The book gives an introduction to this theory, including the analogues of the Hodge Index Theorem, the Arakelov adjunction formula, and the Faltings Riemann-Roch theorem. The book is intended for second year graduate students and researchers in the field who want a systematic introduction to the subject. The residue theorem, which forms the basis for the adjunction formula, is proved by a direct method due to Kunz and Waldi. The Faltings Riemann-Roch theorem is proved without assumptions of semistability. An effort has been made to include all necessary details, and as complete references as possible, especially to needed facts of analysis for Green's functions and the Faltings metrics.

basic mathematics by serge lang: Math Talks for Undergraduates Serge Lang, 2012-12-06

For many years Serge Lang has given talks to undergraduates on selected items in mathematics which could be extracted at a level understandable by students who have had calculus. Written in a conversational tone, Lang now presents a collection of those talks as a book. The talks could be given by faculty, but even better, they may be given by students in seminars run by the students themselves. Undergraduates, and even some high school students, will enjoy the talks which cover prime numbers, the abc conjecture, approximation theorems of analysis, Bruhat-Tits spaces, harmonic and symmetric polynomials, and more in a lively and informal style.

basic mathematics by serge lang: *Undergraduate Algebra* Serge Lang, 2006-10-31 This book, together with Linear Algebra, constitutes a curriculum for an algebra program addressed to undergraduates. The separation of the linear algebra from the other basic algebraic structures fits all existing tendencies affecting undergraduate teaching, and I agree with these tendencies. I have made the present book self contained logically, but it is probably better if students take the linear algebra course before being introduced to the more abstract notions of groups, rings, and fields, and the systematic development of their basic abstract properties. There is of course a little overlap with the book Linear Algebra, since I wanted to make the present book self contained. I define vector spaces, matrices, and linear maps and prove their basic properties. The present book could be used for a one-term course, or a year's course, possibly combining it with Linear Algebra. I think it is important to do the field theory and the Galois theory, more important, say, than to do much more group theory than we have done here. There is a chapter on finite fields, which exhibit both features from general field theory, and special features due to characteristic p . Such fields have become important in coding theory.

basic mathematics by serge lang: Understanding Numbers in Elementary School Mathematics Hongxi Wu, 2011 This is a textbook for pre-service elementary school teachers and for current teachers who are taking professional development courses. By emphasizing the precision of mathematics, the exposition achieves a logical and coherent account of school mathematics at the appropriate level for the readership. Wu provides a comprehensive treatment of all the standard topics about numbers in the school mathematics curriculum: whole numbers, fractions, and rational numbers. Assuming no previous knowledge of mathematics, the presentation develops the basic facts about numbers from the beginning and thoroughly covers the subject matter for grades K through 7. Every single assertion is established in the context of elementary school mathematics in a manner that is completely consistent with the basic requirements of mathematics. While it is a textbook for pre-service elementary teachers, it is also a reference book that school teachers can refer to for explanations of well-known but hitherto unexplained facts. For example, the sometimes-puzzling concepts of percent, ratio, and rate are each given a treatment that is down to earth and devoid of mysticism. The fact that a negative times a negative is a positive is explained in a leisurely and comprehensible fashion.

basic mathematics by serge lang: *Math!* Serge Lang, 1985-09-20 Dieses Buch enthält eine Sammlung von Dialogen des bekannten Mathematikers Serge Lang mit Schülern. Serge Lang behandelt die Schüler als seinesgleichen und zeigt ihnen mit dem ihm eigenen lebendigen Stil etwas vom Wesen des mathematischen Denkens. Die Begegnungen zwischen Lang und den Schülern sind nach Bandaufnahmen aufgezeichnet worden und daher authentisch und lebendig. Das Buch stellt einen frischen und neuartigen Ansatz für Lehren, Lernen und Genuss von Mathematik vor. Das Buch ist von grossem Interesse für Lehrer und Schule

basic mathematics by serge lang: *A First Course in Calculus* Serge Lang, 2012-09-17 The purpose of a first course in calculus is to teach the student the basic notions of derivative and integral, and the basic techniques and applications which accompany them. The very talented students, with an obvious aptitude for mathematics, will rapidly require a course in functions of one real variable, more or less as it is understood by professional is not primarily addressed to them (although mathematicians. This book I hope they will be able to acquire from it a good introduction at an early age). I have not written this course in the style I would use for an advanced monograph, on sophisticated topics. One writes an advanced monograph for oneself, because one wants to give

permanent form to one's vision of some beautiful part of mathematics, not otherwise accessible, somewhat in the manner of a composer setting down his symphony in musical notation. This book is written for the students to give them an immediate, and pleasant, access to the subject. I hope that I have struck a proper compromise, between dwelling too much on special details and not giving enough technical exercises, necessary to acquire the desired familiarity with the subject. In any case, certain routine habits of sophisticated mathematicians are unsuitable for a first course. Rigor. This does not mean that so-called rigor has to be abandoned.

basic mathematics by serge lang: A Concise Course of Mathematics with Applications

Nicolas Laos, 2024-09-19 This book covers the following topics: Mathematical Philosophy; Mathematical Logic; the Structure of Number Sets and the Theory of Real Numbers, Arithmetic and Axiomatic Number Theory, and Algebra (including the study of Sequences and Series); Matrices and Applications in Input-Output Analysis and Linear Programming; Probability and Statistics; Classical Euclidean Geometry, Analytic Geometry, and Trigonometry; Vectors, Vector Spaces, Normed Vector Spaces, and Metric Spaces; basic principles of non-Euclidean Geometries and Metric Geometry; Infinitesimal Calculus and basic Topology (Functions, Limits, Continuity, Topological Structures, Homeomorphisms, Differentiation, and Integration, including Multivariable Calculus and Vector Calculus); Complex Numbers and Complex Analysis; basic principles of Ordinary Differential Equations; as well as mathematical methods and mathematical modeling in the natural sciences (including physics, engineering, biology, and neuroscience) and in the social sciences (including economics, management, strategic studies, and warfare problems).

basic mathematics by serge lang: Complex Analysis Serge Lang, 2013-03-14 The present book is meant as a text for a course on complex analysis at the advanced undergraduate level, or first-year graduate level. The first half, more or less, can be used for a one-semester course addressed to undergraduates. The second half can be used for a second semester, at either level. Somewhat more material has been included than can be covered at leisure in one or two terms, to give opportunities for the instructor to exercise individual taste, and to lead the course in whatever directions strikes the instructor's fancy at the time as well as extra reading material for students on their own. A large number of routine exercises are included for the more standard portions, and a few harder exercises of striking theoretical interest are also included, but may be omitted in courses addressed to less advanced students. In some sense, I think the classical German prewar texts were the best (Hurwitz-Courant, Knopp, Bieberbach, etc.) and I would recommend to anyone to look through them. More recent texts have emphasized connections with real analysis, which is important, but at the cost of exhibiting succinctly and clearly what is peculiar about complex analysis: the power series expansion, the uniqueness of analytic continuation, and the calculus of residues.

basic mathematics by serge lang: Real and Functional Analysis Serge Lang, 2012-12-06

This book is meant as a text for a first year graduate course in analysis. Any standard course in undergraduate analysis will constitute sufficient preparation for its understanding, for instance, my Undergraduate Analysis. I assume that the reader is acquainted with notions of uniform convergence and the like. In this third edition, I have reorganized the book by covering integration before functional analysis. Such a rearrangement fits the way courses are taught in all the places I know of. I have added a number of examples and exercises, as well as some material about integration on the real line (e.g. on Dirac sequence approximation and on Fourier analysis), and some material on functional analysis (e.g. the theory of the Gelfand transform in Chapter XVI). These upgrade previous exercises to sections in the text. In a sense, the subject matter covers the same topics as elementary calculus, viz. linear algebra, differentiation and integration. This time, however, these subjects are treated in a manner suitable for the training of professionals, i.e. people who will use the tools in further investigations, be it in mathematics, or physics, or what have you. In the first part, we begin with point set topology, essential for all analysis, and we cover the most important results.

basic mathematics by serge lang: Basic Modern Theory of Linear Complex Analytic

q-difference Equations Jacques Sauloy, 2024-11-06 The roots of the modern theories of differential and q-difference equations go back in part to an article by George D. Birkhoff, published in 1913, dealing with the three 'sister theories' of differential, difference and q-difference equations. This book is about q-difference equations and focuses on techniques inspired by differential equations, in line with Birkhoff's work, as revived over the last three decades. It follows the approach of the Ramis school, mixing algebraic and analytic methods. While it uses some q-calculus and is illustrated by q-special functions, these are not its main subjects. After a gentle historical introduction with emphasis on mathematics and a thorough study of basic problems such as elementary q-functions, elementary q-calculus, and low order equations, a detailed algebraic and analytic study of scalar equations is followed by the usual process of transforming them into systems and back again. The structural algebraic and analytic properties of systems are then described using q-difference modules (Newton polygon, filtration by the slopes). The final chapters deal with Fuchsian and irregular equations and systems, including their resolution, classification, Riemann-Hilbert correspondence, and Galois theory. Nine appendices complete the book and aim to help the reader by providing some fundamental yet not universally taught facts. There are 535 exercises of various styles and levels of difficulty. The main prerequisites are general algebra and analysis as taught in the first three years of university. The book will be of interest to expert and non-expert researchers as well as graduate students in mathematics and physics.

basic mathematics by serge lang: Algebra Serge Lang, 2005-06-21 This book is intended as a basic text for a one year course in algebra at the graduate level or as a useful reference for mathematicians and professionals who use higher-level algebra. This book successfully addresses all of the basic concepts of algebra. For the new edition, the author has added exercises and made numerous corrections to the text. From MathSciNet's review of the first edition: The author has an impressive knack for presenting the important and interesting ideas of algebra in just the right way, and he never gets bogged down in the dry formalism which pervades some parts of algebra.

basic mathematics by serge lang: Linear Algebra Serge Lang, 1987-01-26 Linear Algebra is intended for a one-term course at the junior or senior level. It begins with an exposition of the basic theory of vector spaces and proceeds to explain the fundamental structure theorem for linear maps, including eigenvectors and eigenvalues, quadratic and hermitian forms, diagonalization of symmetric, hermitian, and unitary linear maps and matrices, triangulation, and Jordan canonical form. The book also includes a useful chapter on convex sets and the finite-dimensional Krein-Milman theorem. The presentation is aimed at the student who has already had some exposure to the elementary theory of matrices, determinants and linear maps. However the book is logically self-contained. In this new edition, many parts of the book have been rewritten and reorganized, and new exercises have been added.

basic mathematics by serge lang: Number Theory III Serge Lang, 2013-12-01 In 1988 Shafarevich asked me to write a volume for the Encyclopaedia of Mathematical Sciences on Diophantine Geometry. I said yes, and here is the volume. By definition, diophantine problems concern the solutions of equations in integers, or rational numbers, or various generalizations, such as finitely generated rings over $\mathbb{Z}$ or finitely generated fields over $\mathbb{Q}$. The word Geometry is tacked on to suggest geometric methods. This means that the present volume is not elementary. For a survey of some basic problems with a much more elementary approach, see [La 90c]. The field of diophantine geometry is now moving quite rapidly. Outstanding conjectures ranging from decades back are being proved. I have tried to give the book some sort of coherence and permanence by emphasizing structural conjectures as much as results, so that one has a clear picture of the field. On the whole, I omit proofs, according to the boundary conditions of the encyclopedia. On some occasions I do give some ideas for the proofs when these are especially important. In any case, a lengthy bibliography refers to papers and books where proofs may be found. I have also followed Shafarevich's suggestion to give examples, and I have especially chosen these examples which show how some classical problems do or do not get solved by contemporary in sights. Fermat's last

theorem occupies an intermediate position. Al though it is not proved, it is not an isolated problem any more.

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basic mathematics by serge lang: [SL2\(R\)](#) S. Lang, 2012-12-06 [SL2\(R\)](#) gives the student an introduction to the infinite dimensional representation theory of semisimple Lie groups by concentrating on one example - $SL_2(\mathbb{R})$. This field is of interest not only for its own sake, but for its connections with other areas such as number theory, as brought out, for example, in the work of Langlands. The rapid development of representation theory over the past 40 years has made it increasingly difficult for a student to enter the field. This book makes the theory accessible to a wide audience, its only prerequisites being a knowledge of real analysis, and some differential equations.

basic mathematics by serge lang: Fundamentals of Differential Geometry Serge Lang, 2001-09-21 This book provides an introduction to the basic concepts in differential topology, differential geometry, and differential equations, and some of the main basic theorems in all three areas. This new edition includes new chapters, sections, examples, and exercises. From the reviews: There are many books on the fundamentals of differential geometry, but this one is quite exceptional; this is not surprising for those who know Serge Lang's books. --EMS NEWSLETTER

basic mathematics by serge lang: The American Mathematical Monthly , 1978 Includes articles, as well as notes and other features, about mathematics and the profession.

basic mathematics by serge lang: Out of the Mouths of Mathematicians: A Quotation Book for Philomaths Rosemary Schmalz, 2020-08-03 Moritz's 'Memorabilia Mathematica' inspired this work, but this one differs in that sources are limited to mathematicians of the 20th century. Useful to researchers to facilitate a literature search, to writers who want to emphasize or substantiate a point, and to teachers, students, and other readers who will have their appetite for the subject whetted by the 83 quotes. -- Book News, Inc.

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