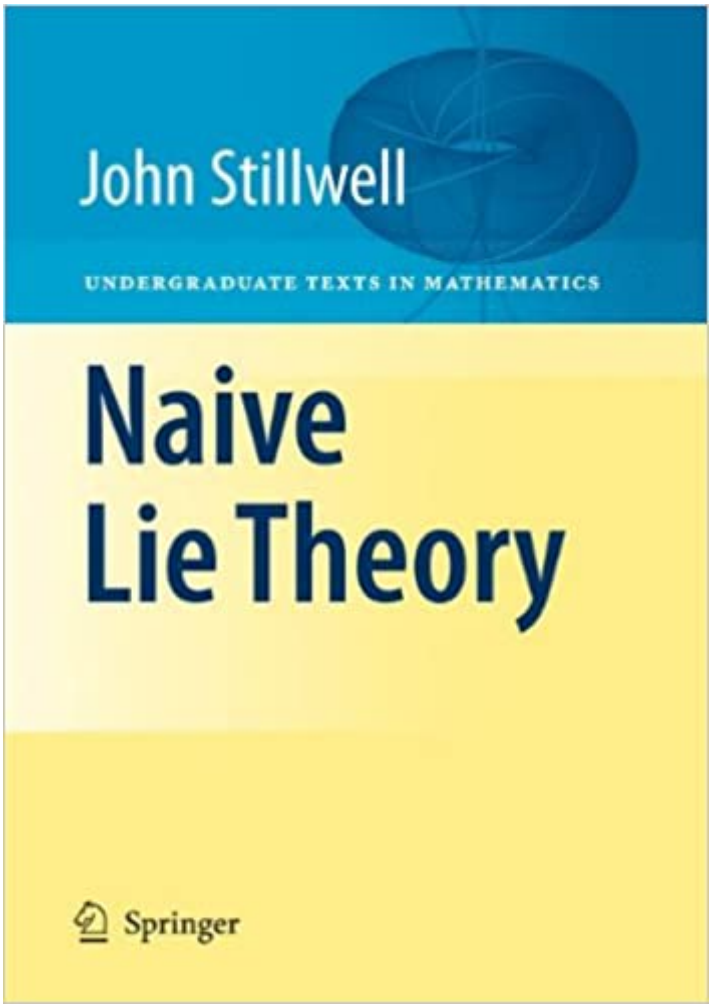
Naive Lie Theory (Undergraduate Texts In Mathematics)



Synopsis

In this new textbook, acclaimed author John Stillwell presents a lucid introduction to Lie theory suitable for junior and senior level undergraduates. In order to achieve this, he focuses on the so-called "classical groups'' that capture the symmetries of real, complex, and quaternion spaces. These symmetry groups may be represented by matrices, which allows them to be studied by elementary methods from calculus and linear algebra. This naive approach to Lie theory is originally due to von Neumann, and it is now possible to streamline it by using standard results of undergraduate mathematics. To compensate for the limitations of the naive approach, end of chapter discussions introduce important results beyond those proved in the book, as part of an informal sketch of Lie theory and its history. John Stillwell is Professor of Mathematics at the University of San Francisco. He is the author of several highly regarded books published by Springer, including The Four Pillars of Geometry (2005), Elements of Number Theory (2003), Mathematics and Its History (Second Edition, 2002), Numbers and Geometry (1998) and Elements of Algebra (1994).

Book Information

Series: Undergraduate Texts in Mathematics

Paperback: 217 pages

Publisher: Springer; 2008 edition (December 1, 2010)

Language: English

ISBN-10: 144192681X

ISBN-13: 978-1441926814

Product Dimensions: 6 x 0.5 x 9 inches

Shipping Weight: 14.6 ounces (View shipping rates and policies)

Average Customer Review: 4.0 out of 5 stars 19 customer reviews

Best Sellers Rank: #496,121 in Books (See Top 100 in Books) #64 inÂ Books > Science & Math > Mathematics > Pure Mathematics > Group Theory #1547 inÂ Books > Textbooks > Science & Mathematics > Mathematics > Algebra & Trigonometry #1919 inÂ Books > Science & Math > Mathematics > Pure Mathematics > Algebra

Customer Reviews

From the reviews:â œAn excellent read. In just 200 pages the author explains what Lie groups and algebras actually are. â | An undergraduate who has taken the calculus series, had a course in linear algebra that discusses matrices, has some knowledge of complex variables and some

understanding of group theory should easily follow the material to this point. â | the best book to get you going.â • (Philosophy, Religion and Science Book Reviews, bookinspections.wordpress.com, July, 2013)â œThere are several aspects of Stillwellâ ™s book that I particularly appreciate. He keeps the sections very short and straightforward, with a few exercises at the end of each to cement understanding. The theory is built up in small bites. He develops an intuition for what is happening by starting with very simple examples and building toward more complicated groups. â | In short, if you want to teach an undergraduate course on Lie theory, I recommend Stillwell.â •(David Bressoud, The UMAP Journal, Vol. 31 (4), 2010)"Lie theory, basically the study of continuous symmetry, certainly occupies a central position in modern mathematics â | . In Naive Lie Theory, Stillwell (Univ. of San Franciso) concentrates on the simplest examples and stops short of representation theory â | . Summing Up: Recommended. Upper-division undergraduates and graduate students." (D. V. Feldman, Choice, Vol. 46 (9), May, 2009)"This book provides an introduction to Lie groups and Lie algebras suitable for undergraduates having no more background than calculus and linear algebra. â | Each chapter concludes with a lively and informative account of the history behind the mathematics in it. The author writes in a clear and engaging style â | . The book is a welcome addition to the literature in representation theory." (William M. McGovern, Mathematical Reviews, Issue 2009 g)"This is a beautifully clear exposition of the main points of Lie theory, aimed at undergraduates who have â | calculus and linear algebra. â | The book is well equipped with examples â | . The book has a very strong geometric flavor, both in the use of rotation groups and in the connection between Lie algebras and Lie groups." (Allen Stenger, The Mathematical Association of America, October, 2008)

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Mathematics and Its History (Second Edition, 2002), Numbers and Geometry (1998) and Elements of Algebra (1994).

It is not often that I buy a math textbook, read it cover to cover, and long for more. Stillwell is an exceptional writer. What differentiates this textbook from others is (1) the historical background material that seamlessly mixes with the equations, and (2) a clear motivation and exposition of important concepts.For readers with physics background: in my opinion Stillwell is the David Griffiths of math. Stillwell does not cover indefinite groups (Lorentz groups) nor does he cover representations. But it is still the best book to get you going.I found this textbook more interesting than Tapp'sÂ Matrix Groups for Undergraduates (Student Mathematical Library,). I think Tapp's book is somewhat more elementary. I could not read Kosmann-Schwarzbach'sÂ Groups and Symmetries: From Finite Groups to Lie Groups (Universitext)Â (translated) beyond chapter 1, the text was concise but encryptic. Georgi'sÂ Lie Algebras In Particle Physics: from Isospin To Unified Theories (Frontiers in Physics)Â was more advanced and kind of dry. Lipkin'sÂ Lie Groups for Pedestrians (Dover Books on Physics)Â was more advanced also. After finishing Stillwell's book I would recommend Hall'sÂ Lie Groups, Lie Algebras, and Representations: An Elementary Introduction.

This is the clearest and simplest introduction to Lie groups of which I am aware. Most texts assume a lot of advanced analysis and group theory. The only text that is somewhat simple is Loewner's, that is based on Lie's own notes. This is a masterful exposition on which a non-mathematician like me can get some grip. A masterful exposition.

Let me start by stating my point of view: I'm a math grad student, so I'm not really the nominal audience for the book (the book is targeted toward undergraduates). Having said that, I found this book to be wonderfully conversational in tone, amusing, very honest (if there is slogging to be done in a proof, the author says so, and if the author leaves something out he tells you why), and very useful in gaining an intuitive feel for the material. The prerequisites for this book are very modest: if you've seen linear algebra and calculus, then you could give it a go. Some sort of exposure to abstract algebra of some sort would be useful, but may not be required. Some intuition for manifolds is is similarly useful, but certainly not required.Even with these modest prerequisites, the author manages to do much with Lie Theory. This is a jewel of a book, much like its spiritual predecessor, Halmos'sÂ Naive Set Theory (Undergraduate Texts in Mathematics).So, this book is accessible,

well written and useful. What more could you ask for in an introduction?

This review is on the textbook Naive Lie Theory by John Stillwell. Recently I purchased this book with hopes of having a study reference to the more elementary parts in preparation for more advanced study of Lie Theory and other theoretical math that involves these ideas. I have not yet finished the book. This book is well written with clear and accurate developments and good examples. There are well placed exercises. One is tempted to try various things, to explore variations based on the readings. I find this exciting the way the book let's me explore ideas. The Author lets you know about the more advanced parts of Lie Theory he is not going to cover so you have an idea what to study later to complete the picture. He decides to use simpler concepts of matrix processes and linear algebra with the understanding that this will allow you to do quite a bit. It is a nice start using the unit circle on the complex plane as an elementary first example. A clear context is given why certain inventions and discoveries were made. I am a mathematician, computer scientist, mathematical physicist, and Formal Languages.

The best thing of reading a math book is that even though you do not understand anything the author is talking about you may still enjoy reading it from cover to cover. From time to time I got lost during the reading and I had to go back to see the definitions of some basic concepts (e.g. What is a Lie group???) Finally, it seems that I understand something. That is, next time when people are talking about Lie group I will not behave like totally ignorant, but only ignorant almost surely. It has strong flavor of "geometric approach" though more illustrations would be appreciated.

I think it is an excellent concise book. It overlaps with the undergraduate curriculum and provides insight from a different perspective on many topics.

The theory is well taught and developed. I found that this book yielded more understanding than the more calculation based references written for physics. As an applied math reader, I feel as if dozens of pages were wasted on proofs that didn't do much, but I suppose I'll give in to the pure mathematician point of view here.My biggest criticism is the heavy use of quaternions. The book introduced two concepts that readers likely aren't familiar with, quaternions and lie groups, and tried to use one to build understand of the other. However, I found this to be of little benefit. The analogies were nice to point out and it was interesting to see the coexistence, but Stillwell took concepts of extreme value and practical use (Lie groups) and obscured them by describing them in

terms of often forgotten and little practical use (quaternions.) As if you wanted to learn a second language, Spanish for example, and the instructor insisted that you used an English -> medieval Latin dictionary followed by a medieval Latin -> Spanish dictionary.The book is a very good book, but with the removal of quaternion emphasis and pedantic proofs in exchange for further developed theory, this book would have been one of my favorites.

Naive Lie Theory (Undergraduate Texts in Mathematics) Lie Groups, Lie Algebras, and Representations: An Elementary Introduction (Graduate Texts in Mathematics) Naive Set Theory (Dover Books on Mathematics) Mathematics and Technology (Springer Undergraduate Texts in Mathematics and Technology) The Mathematics of Nonlinear Programming (Undergraduate Texts in Mathematics) The Art of Proof: Basic Training for Deeper Mathematics (Undergraduate Texts in Mathematics) Linear Algebra: An Introduction to Abstract Mathematics (Undergraduate Texts in Mathematics) Discrete Mathematics: Elementary and Beyond (Undergraduate Texts in Mathematics) Proofs and Fundamentals: A First Course in Abstract Mathematics (Undergraduate Texts in Mathematics) Mathematics and Its History (Undergraduate Texts in Mathematics) Reading, Writing, and Proving: A Closer Look at Mathematics (Undergraduate Texts in Mathematics) The Mathematics of Medical Imaging: A Beginnerâ ™s Guide (Springer Undergraduate Texts in Mathematics and Technology) Combinatorics and Graph Theory (Springer Undergraduate Texts in Mathematics and Technology) Combinatorics and Graph Theory (Undergraduate Texts in Mathematics) Mathematical Introduction to Linear Programming and Game Theory (Undergraduate Texts in Mathematics) Elementary Number Theory: Primes, Congruences, and Secrets: A Computational Approach (Undergraduate Texts in Mathematics) Elementary Analysis: The Theory of Calculus (Undergraduate Texts in Mathematics) The Joy of Sets: Fundamentals of Contemporary Set Theory (Undergraduate Texts in Mathematics) Introduction to Lie Algebras and Representation Theory (Graduate Texts in Mathematics) (v. 9) Emergence of the Theory of Lie Groups: An Essay in the History of Mathematics 1869â “1926 (Sources and Studies in the History of Mathematics and Physical Sciences)