Introduction To 3 Manifolds Graduate Studies In Mathematics

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This book grew out of a graduate course on 3-manifolds and is intended for a mathematically experienced audience that is new to low-dimensional topology. The exposition begins with the definition of a manifold, explores possible additional structures on manifolds, discusses the classification of surfaces, introduces key foundational results for 3-manifolds, and provides an overview of knot theory.

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Introduction to 3-manifolds / Jennifer Schultens. pages cm — (Graduate studies in mathematics ; v. 151) Includes bibliographical references and index. ISBN 978-1-4704-1020-9 (alk. paper) 1. Topological manifolds. 2. Manifolds (Mathematics) I. Title. II. Title: Introduction to three-manifolds. QA613.2.S35 2014 514 .34—dc23 2013046541 Copying and reprinting.

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Introduction to 3-Manifolds is a mathematics book on low-dimensional topology. It was written by Jennifer Schultens and published by the American Mathematical Society in 2014 as volume 151 of their book series Graduate Studies in Mathematics .

Introduction to 3-Manifolds - Wikipedia

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Introduction To 3 Manifolds Graduate Studies In Mathematics

This textbook is designed for a one or two semester graduate course on Riemannian geometry for students who are familiar with topological and differentiable manifolds. The second edition has been adapted, expanded, and aptly retitled from Lee's earlier book, Riemannian Manifolds: An Introduction to Curvature .

Introduction to Riemannian Manifolds |

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This book is designed as a ?rst-year graduate text on manifold theory, for stu-dents who already have a solid acquaintance with undergraduate linear algebra, real analysis, and topology. I have tried to focus on the portions of manifold theory that will be needed by most people who go on to use manifolds in mathematical or sci-enti?c research.

Graduate Texts in Mathematics 218

This book is an introductory graduate-level textbook on the theory of smooth manifolds. Its goal is to familiarize students with the tools they will need in order to use manifolds in mathematical or scientific research—smooth structures, tangent vectors and covectors, vector bundles, immersed and embedded submanifolds, tensors, differential forms, de Rham cohomology, vector fields, flows ...

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In topology, a branch of mathematics, a topological manifold is a topological space (which may also be a separated space) which locally resembles real n-dimensional space in a sense defined below. Topological manifolds form an important class of topological spaces with applications throughout mathematics. All manifolds are topological manifolds by definition, but many manifolds may be equipped ...

Topological manifold - Wikipedia

This book is an introductory graduate-level textbook on the theory of smooth manifolds. Its goal is to familiarize students with the tools they will need in order to use manifolds in mathematical or scientific research--- smooth structures, tangent vectors and covectors, vector bundles, immersed and embedded submanifolds, tensors, differential forms, de Rham cohomology, vector fields, flows ...

Introduction to Smooth Manifolds | John Lee | Springer

What Are Manifolds? 3 Fig. 1.3: Doughnut surface. The only higher-dimensional manifold that we can easily visualize is Euclidean 3-space (or parts of it). But it is not hard to construct subsets of higher-dimensional Euclidean spaces that might reasonably be called manifolds. First, any open subset of Rnis an n-manifold for obvious reasons. More interesting examples are obtained

Chapter 1 Introduction

Graduate Studies in Mathematics (GSM) is a series of graduate-level textbooks in mathematics published by the American Mathematical Society (AMS). These books elaborate on several theories from notable personas, such as Martin Schechter and Terence Tao, in the mathematical industry.The books in this series are published only in hardcover.

This book grew out of a graduate course on 3-manifolds and is intended for a mathematically experienced audience that is new to low-dimensional topology. The exposition begins with the definition of a manifold, explores possible additional structures on manifolds, discusses the classification of surfaces, introduces key foundational results for 3-manifolds, and provides an overview of knot theory. It then continues with more specialized topics by briefly considering triangulations of 3-manifolds, normal surface theory, and Heegaard splittings. The book finishes with a discussion of topics relevant to viewing 3-manifolds via the curve complex. With about 250 figures and more than 200 exercises, this book can serve as an excellent overview and starting point for the study of 3-manifolds.

Recently there has been considerable interest in developing techniques based on number theory to attack problems of 3-manifolds; Contains many examples and lots of problems; Brings together much of the existing literature of Kleinian groups in a clear and concise way; At present no such text exists

Author has written several excellent Springer books.; This book is a sequel to Introduction to Topological Manifolds; Careful and illuminating explanations, excellent diagrams and exemplary motivation; Includes short preliminary sections before each section explaining what is ahead and why

A careful and systematic development of the theory of the topology of 3-manifolds, focusing on the critical role of the fundamental group in determining the topological structure of a 3-manifold ... self-contained ... one can learn the subject from it ... would be very appropriate as a text for an advanced graduate course or as a basis for a working seminar. --Mathematical Reviews For many years, John Hempel's book has been a standard text on the topology of 3-manifolds. Even though the field has grown tremendously, the book remains one of the best and most popular introductions to the subject. The theme of this book is the role of the fundamental group in determining the topology of a given 3-manifold. The essential ideas and techniques are covered in the first part of the book: Heegaard splittings, connected sums, the loop and sphere theorems, incompressible surfaces, free groups, and so on. Along the way, many useful and insightful results are proved, usually in full detail. Later chapters address more advanced topics, including Waldhausen's theorem on a class of 3-manifolds that is completely determined by its fundamental group. The book concludes with a list of problems that were unsolved at the time of publication. Hempel's book remains an ideal text to learn about the world of 3-manifolds. The prerequisites are few and are typical of a beginning graduate student. Exercises occur throughout the text.

Manifolds play an important role in topology, geometry, complex analysis, algebra, and classical mechanics. Learning manifolds differs from most other introductory mathematics in that the subject matter is often completely unfamiliar. This introduction guides readers by explaining the roles manifolds play in diverse branches of mathematics and physics. The book begins with the basics of general topology and gently moves to manifolds, the fundamental group, and covering spaces.

This book is an exposition of the theoretical foundations of hyperbolic manifolds. It is intended to be used both as a textbook and as a reference. Particular emphasis has been placed on readability and completeness of ar gument. The treatment of the material is for the most part elementary and self-contained. The reader is assumed to have a basic knowledge of algebra and topology at the first-year graduate level of an American university. The book is divided into three parts. The first part, consisting of Chap ters 1-7, is concerned with hyperbolic geometry and basic properties of discrete groups of isometries of hyperbolic space. The main results are the existence theorem for discrete reflection groups, the Bieberbach theorems, and Selberg's lemma. The second part, consisting of Chapters 8-12, is de voted to the theory of hyperbolic manifolds. The main results are Mostow's rigidity theorem and the determination of the structure of geometrically finite hyperbolic manifolds. The third part, consisting of Chapter 13, in tegrates the first two parts in a development of the theory of hyperbolic orbifolds. The main results are the construction of the universal orbifold covering space and Poincare's fundamental polyhedron theorem.

This text focuses on developing an intimate acquaintance with the geometric meaning of curvature and thereby introduces and demonstrates all the main technical tools needed for a more advanced course on Riemannian manifolds. It covers proving the four most fundamental theorems relating curvature and topology: the Gauss-Bonnet Theorem, the Cartan-Hadamard Theorem, Bonnet’s Theorem, and a special case of the Cartan-Ambrose-Hicks Theorem.

This book is an introduction to the remarkable work of Vaughan Jones and Victor Vassiliev on knot and link invariants and its recent modifications and generalizations, including a mathematical treatment of Jones-Witten invariants. It emphasizes the geometric aspects of the theory and treats topics such as braids, homeomorphisms of surfaces, surgery of 3-manifolds (Kirby calculus), and branched coverings. This attractive geometric material, interesting in itself yet not previously gathered in book form, constitutes the basis of the last two chapters, where the Jones-Witten invariants are constructed via the rigorous skein algebra approach (mainly due to the Saint Petersburg school). Unlike several recent monographs, where all of these invariants are introduced by using the sophisticated abstract algebra of quantum groups and representation theory, the mathematical prerequisites are minimal in this book. Numerous figures and problems make it suitable as a course text and for self-study.

Manifolds, the higher-dimensional analogs of smooth curves and surfaces, are fundamental objects in modern mathematics. Combining aspects of algebra, topology, and analysis, manifolds have also been applied to classical mechanics, general relativity, and quantum field theory. In this streamlined introduction to the subject, the theory of manifolds is presented with the aim of helping the reader achieve a rapid mastery of the essential topics. By the end of the book the reader should be able to compute, at least for simple spaces, one of the most basic topological invariants of a manifold, its de Rham cohomology. Along the way, the reader acquires the knowledge and skills necessary for further study of geometry and topology. The requisite point-set topology is included in an appendix of twenty pages; other appendices review facts from real analysis and linear algebra. Hints and solutions are provided to many of the exercises and problems. This work may be used as the text for a one-semester graduate or advanced undergraduate course, as well as by students engaged in self-study. Requiring only minimal undergraduate prerequisites, 'Introduction to Manifolds' is also an excellent foundation for Springer's GTM 82, 'Differential Forms in Algebraic Topology'.