

PRIMER OF MAPPING CLASS GROUPS

PRIMER OF MAPPING CLASS GROUPS PROVIDES AN ESSENTIAL INTRODUCTION TO ONE OF THE CENTRAL OBJECTS IN GEOMETRIC TOPOLOGY AND ALGEBRAIC GEOMETRY. THIS FUNDAMENTAL CONCEPT PLAYS A PIVOTAL ROLE IN UNDERSTANDING THE SYMMETRIES OF SURFACES AND THEIR MODULI SPACES. THE PRIMER COVERS THE DEFINITION, BASIC PROPERTIES, AND SIGNIFICANT APPLICATIONS OF MAPPING CLASS GROUPS, OFFERING A COMPREHENSIVE OVERVIEW SUITABLE FOR BOTH BEGINNERS AND ADVANCED SCHOLARS. KEY TOPICS INCLUDE THE ALGEBRAIC STRUCTURE OF THESE GROUPS, THEIR CONNECTIONS TO TEICHMÜLLER THEORY, AND THEIR IMPLICATIONS IN LOW-DIMENSIONAL TOPOLOGY. THIS ARTICLE ALSO EXPLORES NOTABLE RESULTS AND CLASSICAL THEOREMS THAT SHAPE THE STUDY OF MAPPING CLASS GROUPS. THE DISCUSSION NATURALLY PROGRESSES INTO A STRUCTURED EXAMINATION OF THE SUBJECT, BEGINNING WITH FOUNDATIONAL DEFINITIONS, MOVING THROUGH ALGEBRAIC AND GEOMETRIC ASPECTS, AND CULMINATING IN ADVANCED APPLICATIONS. THE FOLLOWING SECTIONS OUTLINE THE KEY THEMES COVERED IN THIS PRIMER OF MAPPING CLASS GROUPS.

- DEFINITION AND BASIC PROPERTIES OF MAPPING CLASS GROUPS
- ALGEBRAIC STRUCTURE AND GENERATORS
- CONNECTIONS TO TEICHMÜLLER THEORY
- APPLICATIONS IN TOPOLOGY AND GEOMETRY
- CLASSICAL THEOREMS AND RECENT DEVELOPMENTS

DEFINITION AND BASIC PROPERTIES OF MAPPING CLASS GROUPS

THE MAPPING CLASS GROUP OF A SURFACE IS A FUNDAMENTAL CONCEPT IN TOPOLOGY THAT ENCODES THE SYMMETRIES OF THE SURFACE UP TO ISOTOPY. FORMALLY, FOR A CLOSED, ORIENTED SURFACE (S) , THE MAPPING CLASS GROUP, OFTEN DENOTED AS $(\text{Mod}(S))$ OR $(\Gamma(S))$, IS DEFINED AS THE GROUP OF ISOTOPY CLASSES OF ORIENTATION-PRESERVING HOMEOMORPHISMS OF (S) . THIS MEANS EACH ELEMENT REPRESENTS AN EQUIVALENCE CLASS OF HOMEOMORPHISMS WHERE TWO HOMEOMORPHISMS ARE CONSIDERED THE SAME IF ONE CAN BE CONTINUOUSLY DEFORMED INTO THE OTHER WITHOUT CUTTING OR GLUING THE SURFACE.

MAPPING CLASS GROUPS CAPTURE THE GLOBAL SYMMETRIES AND PLAY A CRUCIAL ROLE IN UNDERSTANDING THE MODULI SPACE OF RIEMANN SURFACES. THEY ALSO SERVE AS A BRIDGE BETWEEN GEOMETRIC TOPOLOGY, ALGEBRAIC GEOMETRY, AND GROUP THEORY. KEY PROPERTIES INCLUDE BEING FINITELY GENERATED AND OFTEN HAVING RICH ALGEBRAIC STRUCTURES THAT REFLECT THE TOPOLOGY OF THE UNDERLYING SURFACE.

SURFACES AND ISOTOPIES

SURFACES CONSIDERED IN THE STUDY OF MAPPING CLASS GROUPS ARE TYPICALLY COMPACT, CONNECTED, AND ORIENTED. THEY CAN HAVE BOUNDARY COMPONENTS OR PUNCTURES, AND THESE FEATURES AFFECT THE STRUCTURE OF THE MAPPING CLASS GROUP. ISOTOPIES ARE CONTINUOUS DEFORMATIONS THROUGH HOMEOMORPHISMS, WHICH ENSURE THE CLASSIFICATION FOCUSES ON THE ESSENTIAL SYMMETRIES RATHER THAN ARBITRARY DEFORMATIONS.

NOTATION AND EXAMPLES

THE NOTATION $(\text{Mod}(S_{g,n}))$ IS COMMONLY USED TO DENOTE THE MAPPING CLASS GROUP OF A SURFACE OF GENUS (g) WITH (n) BOUNDARY COMPONENTS OR PUNCTURES. FOR EXAMPLE, $(\text{Mod}(S_{0,3}))$ CORRESPONDS TO THE MAPPING CLASS GROUP OF A SPHERE WITH THREE PUNCTURES, WHICH IS ISOMORPHIC TO THE BRAID GROUP ON THREE STRANDS MODULO ITS CENTER.

ALGEBRAIC STRUCTURE AND GENERATORS

UNDERSTANDING THE ALGEBRAIC STRUCTURE OF MAPPING CLASS GROUPS IS ESSENTIAL FOR STUDYING THEIR PROPERTIES AND APPLICATIONS. THESE GROUPS ARE FINITELY GENERATED AND OFTEN ADMIT FINITE PRESENTATIONS. A KEY RESULT IN THIS AREA IS THAT THE MAPPING CLASS GROUP CAN BE GENERATED BY A FINITE SET OF DEHN TWISTS, WHICH ARE SPECIFIC HOMEOMORPHISMS ASSOCIATED WITH SIMPLE CLOSED CURVES ON THE SURFACE.

DEHN TWISTS

DEHN TWISTS ARE ELEMENTARY BUILDING BLOCKS OF THE MAPPING CLASS GROUP. GIVEN A SIMPLE CLOSED CURVE ON THE SURFACE, A DEHN TWIST CUTS THE SURFACE ALONG THE CURVE, TWISTS ONE SIDE BY 360 DEGREES, AND THEN REGLUES. SUCH TWISTS GENERATE THE ENTIRE MAPPING CLASS GROUP FOR SURFACES OF GENUS AT LEAST ONE, MAKING THEM FUNDAMENTAL TO THE ALGEBRAIC UNDERSTANDING OF THESE GROUPS.

FINITE PRESENTATIONS

MAPPING CLASS GROUPS ADMIT FINITE PRESENTATIONS INVOLVING GENERATORS AND RELATIONS. THE CLASSICAL PRESENTATIONS, SUCH AS THOSE DEVELOPED BY DEHN, LICKORISH, AND HUMPHRIES, PROVIDE EXPLICIT GENERATORS AND RELATIONS. FOR INSTANCE, HUMPHRIES SHOWED THAT A MINIMAL GENERATING SET FOR $\pi_1(\text{Mod}(S_g))$ CONSISTS OF $(2g + 1)$ DEHN TWISTS. THESE PRESENTATIONS ALLOW FOR COMPUTATIONAL AND THEORETICAL ANALYSIS OF THE GROUP'S STRUCTURE.

GROUP PROPERTIES

MAPPING CLASS GROUPS EXHIBIT RICH ALGEBRAIC PROPERTIES, INCLUDING:

- BEING RESIDUALLY FINITE, MEANING EVERY NONTRIVIAL ELEMENT CAN BE DETECTED IN SOME FINITE QUOTIENT.
- HAVING TORSION ELEMENTS CORRESPONDING TO PERIODIC HOMEOMORPHISMS OF SURFACES.
- CONTAINING IMPORTANT SUBGROUPS SUCH AS THE TORELLI GROUP, WHICH ACTS TRIVIALY ON HOMOLOGY.

CONNECTIONS TO TEICHMÜLLER THEORY

TEICHMÜLLER THEORY STUDIES THE SPACE OF COMPLEX STRUCTURES ON A SURFACE, KNOWN AS TEICHMÜLLER SPACE. THE MAPPING CLASS GROUP ACTS NATURALLY ON THIS SPACE BY CHANGING THE MARKINGS OF SURFACES, AND THIS ACTION IS FUNDAMENTAL TO UNDERSTANDING BOTH THE GEOMETRY OF TEICHMÜLLER SPACE AND THE STRUCTURE OF MODULI SPACES.

TEICHMÜLLER SPACE AND MODULI SPACE

TEICHMÜLLER SPACE $\mathcal{T}(S)$ IS THE SPACE OF MARKED CONFORMAL STRUCTURES ON A SURFACE (S) , UP TO ISOTOPY. IT IS CONTRACTIBLE AND CARRIES A NATURAL COMPLEX STRUCTURE. THE MODULI SPACE $\mathcal{M}(S)$ IS OBTAINED AS THE QUOTIENT OF $\mathcal{T}(S)$ BY THE MAPPING CLASS GROUP ACTION, REPRESENTING UNMARKED COMPLEX STRUCTURES. THIS QUOTIENT IS AN ORBIFOLD THAT ENCODES THE GEOMETRY OF RIEMANN SURFACES.

ACTION OF THE MAPPING CLASS GROUP

THE MAPPING CLASS GROUP ACTS PROPERLY DISCONTINUOUSLY ON TEICHMÜLLER SPACE BY CHANGING THE MARKING OF SURFACES. THIS ACTION IS CENTRAL TO THE STUDY OF MODULI SPACES AND YIELDS DEEP INSIGHTS INTO GEOMETRIC STRUCTURES ON SURFACES. THE DYNAMICS OF THIS ACTION ARE ALSO A RICH AREA OF RESEARCH, WITH CONNECTIONS TO ERGODIC THEORY AND GEOMETRIC GROUP THEORY.

APPLICATIONS IN COMPLEX ANALYSIS AND GEOMETRY

THE INTERPLAY BETWEEN MAPPING CLASS GROUPS AND TEICHMÜLLER THEORY FACILITATES PROGRESS IN COMPLEX ANALYSIS, ALGEBRAIC GEOMETRY, AND HYPERBOLIC GEOMETRY. FOR INSTANCE, IT HELPS DESCRIBE THE DEFORMATION SPACES OF HYPERBOLIC STRUCTURES AND PROVIDES TOOLS FOR UNDERSTANDING THE GEOMETRY OF MODULI SPACES AND MAPPING CLASS GROUP ORBITS.

APPLICATIONS IN TOPOLOGY AND GEOMETRY

MAPPING CLASS GROUPS HAVE WIDESPREAD APPLICATIONS ACROSS VARIOUS FIELDS IN MATHEMATICS, PARTICULARLY IN LOW-DIMENSIONAL TOPOLOGY AND GEOMETRIC STRUCTURES. THEIR STUDY YIELDS INSIGHTS INTO 3-MANIFOLD THEORY, KNOT THEORY, AND SYMPLECTIC GEOMETRY.

3-MANIFOLD THEORY

MAPPING CLASS GROUPS APPEAR NATURALLY IN THE THEORY OF 3-MANIFOLDS THROUGH HEEGAARD SPLITTINGS. A 3-MANIFOLD CAN BE DECOMPOSED INTO TWO HANDLEBODIES GLUED ALONG A SURFACE, AND THE GLUING MAP, AN ELEMENT OF THE MAPPING CLASS GROUP, DETERMINES THE MANIFOLD'S TOPOLOGY. THUS, UNDERSTANDING MAPPING CLASS GROUPS AIDS IN CLASSIFYING 3-MANIFOLDS.

KNOT THEORY AND BRAIDS

THE BRAID GROUP IS CLOSELY RELATED TO THE MAPPING CLASS GROUP OF A PUNCTURED DISK. THIS CONNECTION ENABLES THE APPLICATION OF MAPPING CLASS GROUP TECHNIQUES TO KNOT THEORY, PARTICULARLY IN STUDYING BRAID REPRESENTATIONS OF KNOTS AND LINKS AND THEIR INVARIANTS.

SYMPLECTIC AND ALGEBRAIC GEOMETRY

MAPPING CLASS GROUPS ALSO ARISE IN SYMPLECTIC GEOMETRY AS GROUPS OF SYMPLECTOMORPHISMS UP TO ISOTOPY, REFLECTING SYMMETRIES OF SYMPLECTIC MANIFOLDS. IN ALGEBRAIC GEOMETRY, THEY RELATE TO MONODROMY REPRESENTATIONS AND MODULI PROBLEMS, LINKING TOPOLOGICAL AND ALGEBRAIC PERSPECTIVES.

CLASSICAL THEOREMS AND RECENT DEVELOPMENTS

THE STUDY OF MAPPING CLASS GROUPS HAS A RICH HISTORY WITH MANY CLASSICAL RESULTS THAT FORM THE FOUNDATION OF MODERN RESEARCH. ADDITIONALLY, RECENT DEVELOPMENTS HAVE EXPANDED UNDERSTANDING AND UNVEILED NEW CONNECTIONS TO OTHER MATHEMATICAL AREAS.

CLASSICAL RESULTS

IMPORTANT CLASSICAL THEOREMS INCLUDE:

1. **DEHN-NIELSEN-BAER THEOREM:** ESTABLISHES AN ISOMORPHISM BETWEEN THE MAPPING CLASS GROUP AND THE OUTER AUTOMORPHISM GROUP OF THE SURFACE'S FUNDAMENTAL GROUP.
2. **LICKORISH GENERATORS THEOREM:** DEMONSTRATES THAT A FINITE SET OF DEHN TWISTS GENERATES THE ENTIRE MAPPING CLASS GROUP.
3. **BIRMAN EXACT SEQUENCE:** DESCRIBES THE RELATIONSHIP BETWEEN MAPPING CLASS GROUPS OF SURFACES WITH DIFFERENT NUMBERS OF PUNCTURES.

RECENT ADVANCES

RECENT RESEARCH HAS FOCUSED ON:

- UNDERSTANDING THE GEOMETRY AND DYNAMICS OF MAPPING CLASS GROUP ACTIONS ON VARIOUS SPACES.
- EXPLORING CONNECTIONS WITH GEOMETRIC GROUP THEORY, INCLUDING PROPERTIES LIKE HYPERBOLICITY AND $CAT(0)$ STRUCTURES.
- INVESTIGATING THE STRUCTURE AND COHOMOLOGY OF SUBGROUPS SUCH AS THE TORELLI GROUP AND JOHNSON KERNEL.
- APPLICATIONS TO STRING THEORY, QUANTUM TOPOLOGY, AND CATEGORIFICATION.

OPEN QUESTIONS

DESPITE SIGNIFICANT PROGRESS, MANY OPEN PROBLEMS REMAIN, SUCH AS CLASSIFYING ALL POSSIBLE FINITE SUBGROUPS, UNDERSTANDING THE FULL STRUCTURE OF CERTAIN SUBGROUPS, AND EXPLORING THE MAPPING CLASS GROUP'S ROLE IN HIGHER-DIMENSIONAL ANALOGUES.

FREQUENTLY ASKED QUESTIONS

WHAT IS A MAPPING CLASS GROUP IN TOPOLOGY?

A MAPPING CLASS GROUP OF A SURFACE IS THE GROUP OF ISOTOPY CLASSES OF ORIENTATION-PRESERVING SELF-HOMEOMORPHISMS OF THAT SURFACE. IT ENCODES SYMMETRIES OF THE SURFACE UP TO CONTINUOUS DEFORMATION.

WHY IS A PRIMER ON MAPPING CLASS GROUPS IMPORTANT FOR MATHEMATICIANS?

A PRIMER ON MAPPING CLASS GROUPS PROVIDES FOUNDATIONAL KNOWLEDGE ABOUT THESE GROUPS, WHICH ARE CENTRAL IN LOW-DIMENSIONAL TOPOLOGY, GEOMETRIC GROUP THEORY, AND ALGEBRAIC GEOMETRY. IT HELPS RESEARCHERS UNDERSTAND SURFACE SYMMETRIES, MODULI SPACES, AND RELATED STRUCTURES.

WHAT ARE SOME KEY TOPICS COVERED IN A PRIMER OF MAPPING CLASS GROUPS?

KEY TOPICS INCLUDE THE DEFINITION OF MAPPING CLASS GROUPS, DEHN TWISTS, THE NIELSEN-THURSTON CLASSIFICATION OF SURFACE HOMEOMORPHISMS, THE ACTION ON $\text{Teich}(S)$ SPACE, AND CONNECTIONS TO BRAID GROUPS AND MODULI SPACES.

HOW DOES THE NIELSEN-THURSTON CLASSIFICATION RELATE TO MAPPING CLASS GROUPS?

THE NIELSEN-THURSTON CLASSIFICATION CATEGORIZES ELEMENTS OF THE MAPPING CLASS GROUP INTO THREE TYPES: PERIODIC, REDUCIBLE, AND PSEUDO-ANOSOV. THIS CLASSIFICATION IS FUNDAMENTAL FOR UNDERSTANDING THE DYNAMICS AND ALGEBRAIC PROPERTIES OF MAPPING CLASSES.

WHAT ARE SOME MODERN APPLICATIONS OF THE THEORY OF MAPPING CLASS GROUPS?

MAPPING CLASS GROUPS APPEAR IN VARIOUS AREAS SUCH AS THE STUDY OF 3-MANIFOLDS, STRING THEORY, TEICHMÜLLER THEORY, AND QUANTUM TOPOLOGY. THEY ARE ALSO USED IN UNDERSTANDING MODULI SPACES OF RIEMANN SURFACES AND HAVE CONNECTIONS TO COMBINATORIAL GROUP THEORY.

ADDITIONAL RESOURCES

1. *A PRIMER ON MAPPING CLASS GROUPS* BY BENSON FARB AND DAN MARGALIT

THIS BOOK SERVES AS AN ACCESSIBLE INTRODUCTION TO THE THEORY OF MAPPING CLASS GROUPS, WHICH ARE CENTRAL OBJECTS IN GEOMETRIC TOPOLOGY AND LOW-DIMENSIONAL GEOMETRY. IT COVERS FOUNDATIONAL CONCEPTS SUCH AS DEHN TWISTS, CURVE COMPLEXES, AND NIELSEN-THURSTON CLASSIFICATION. THE TEXT BALANCES RIGOROUS PROOFS WITH INTUITIVE EXPLANATIONS, MAKING IT SUITABLE FOR GRADUATE STUDENTS AND RESEARCHERS NEW TO THE FIELD.

2. *MAPPING CLASS GROUPS AND MODULI SPACES OF RIEMANN SURFACES* EDITED BY BENSON FARB

THIS COLLECTION OF SURVEY ARTICLES EXPLORES THE INTERPLAY BETWEEN MAPPING CLASS GROUPS AND MODULI SPACES OF RIEMANN SURFACES. IT INCLUDES CONTRIBUTIONS FROM LEADING EXPERTS DISCUSSING TOPICS SUCH AS TEICHMÜLLER THEORY, AUTOMORPHISMS OF SURFACES, AND APPLICATIONS TO ALGEBRAIC GEOMETRY. THE VOLUME IS IDEAL FOR THOSE INTERESTED IN THE GEOMETRIC AND ALGEBRAIC ASPECTS OF MAPPING CLASS GROUPS.

3. *INTRODUCTION TO TEICHMÜLLER SPACE* BY Y. IMAYOSHI AND M. TANIGUCHI

THOUGH PRIMARILY FOCUSED ON TEICHMÜLLER THEORY, THIS BOOK PROVIDES ESSENTIAL BACKGROUND ON MAPPING CLASS GROUPS THROUGH THEIR ACTION ON TEICHMÜLLER SPACES. IT OFFERS DETAILED TREATMENTS OF HYPERBOLIC GEOMETRY, QUASICONFORMAL MAPPINGS, AND THE STRUCTURE OF MODULI SPACES. THE TEXT IS WELL-SUITED FOR READERS SEEKING A GEOMETRIC PERSPECTIVE ON MAPPING CLASS GROUPS.

4. *AUTOMORPHISMS OF SURFACES AFTER NIELSEN AND THURSTON* BY ANDREW J. CASSON AND STEVEN A. BLEILER

THIS CLASSIC TEXT DELVES INTO THE NIELSEN-THURSTON CLASSIFICATION OF SURFACE AUTOMORPHISMS, A CORNERSTONE IN THE STUDY OF MAPPING CLASS GROUPS. IT EXPLAINS THE CLASSIFICATION INTO PERIODIC, REDUCIBLE, AND PSEUDO-ANOSOV TYPES, PROVIDING PROOFS AND EXAMPLES. THE BOOK IS A VALUABLE RESOURCE FOR UNDERSTANDING THE DYNAMICAL ASPECTS OF MAPPING CLASS GROUPS.

5. *GEOMETRIC GROUP THEORY* EDITED BY CORNELIA DRUȚU AND MICHAEL KAPOVICH

WHILE COVERING A BROAD RANGE OF TOPICS IN GEOMETRIC GROUP THEORY, THIS VOLUME INCLUDES IMPORTANT CHAPTERS ON MAPPING CLASS GROUPS AND THEIR GEOMETRIC PROPERTIES. IT DISCUSSES CURVE COMPLEXES, HYPERBOLICITY, AND RIGIDITY PHENOMENA ASSOCIATED WITH MAPPING CLASS GROUPS. THE BOOK IS SUITABLE FOR READERS INTERESTED IN THE BROADER CONTEXT OF MAPPING CLASS GROUPS WITHIN GEOMETRIC GROUP THEORY.

6. *SURFACE HOMEOMORPHISMS AND THEIR MAPPING CLASS GROUPS* BY JOAN S. BIRMAN

JOAN BIRMAN'S WORK PROVIDES A COMPREHENSIVE STUDY OF SURFACE HOMEOMORPHISMS AND THE RESULTING MAPPING CLASS GROUPS. IT COVERS BRAID GROUPS, DEHN TWISTS, AND THE ALGEBRAIC STRUCTURE OF MAPPING CLASS GROUPS. THIS FOUNDATIONAL TEXT IS OFTEN RECOMMENDED FOR THOSE BEGINNING RESEARCH IN THE TOPOLOGY OF SURFACES.

7. *COMBINATORIAL GROUP THEORY AND TOPOLOGY* EDITED BY S.M. GERSTEN AND J.R. STALLINGS

THIS COLLECTION INCLUDES INFLUENTIAL PAPERS AND SURVEYS RELATED TO THE ALGEBRAIC AND TOPOLOGICAL ASPECTS OF MAPPING CLASS GROUPS. TOPICS SUCH AS PRESENTATIONS OF GROUPS, COMPLEXES OF CURVES, AND APPLICATIONS TO 3-MANIFOLDS ARE TREATED. IT IS AN EXCELLENT RESOURCE FOR UNDERSTANDING THE COMBINATORIAL SIDE OF MAPPING CLASS GROUPS.

8. *TRAIN TRACKS AND SURFACE HOMEOMORPHISMS* BY R.C. PENNER AND J.L. HARER

FOCUSING ON TRAIN TRACK TECHNIQUES, THIS BOOK PROVIDES POWERFUL TOOLS FOR STUDYING MAPPING CLASS GROUPS AND SURFACE AUTOMORPHISMS. IT EXPLORES THE COMBINATORIAL AND GEOMETRIC METHODS THAT ILLUMINATE THE STRUCTURE OF MAPPING CLASS GROUPS, ESPECIALLY IN THE CONTEXT OF PSEUDO-ANOSOV HOMEOMORPHISMS. THE TEXT IS BOTH COMPREHENSIVE AND TECHNICAL, SUITABLE FOR ADVANCED READERS.

9. *HYPERBOLIC GEOMETRY AND MAPPING CLASS GROUPS* BY LEE MOSHER

THIS MONOGRAPH EXPLORES THE RICH CONNECTIONS BETWEEN HYPERBOLIC GEOMETRY AND MAPPING CLASS GROUPS, EMPHASIZING THE GEOMETRIC STRUCTURES THAT ARISE FROM SURFACE GROUP ACTIONS. IT DISCUSSES HYPERBOLIC 3-MANIFOLDS, CURVE COMPLEXES, AND THE GEOMETRY OF THE TEICHMÜLLER SPACE. THE BOOK IS VALUABLE FOR THOSE INTERESTED IN THE GEOMETRIC AND DYNAMICAL ASPECTS OF MAPPING CLASS GROUPS.

Primer Of Mapping Class Groups

Find other PDF articles:

<https://www-01.massdevelopment.com/archive-library-607/files?dataid=Mta95-8025&title=pre-k-4-s-a-south-education-center.pdf>

primer of mapping class groups: A Primer on Mapping Class Groups Benson Farb, Dan Margalit, 2011-09-26 The study of the mapping class group $\text{Mod}(S)$ is a classical topic that is experiencing a renaissance. It lies at the juncture of geometry, topology, and group theory. This book explains as many important theorems, examples, and techniques as possible, quickly and directly, while at the same time giving full details and keeping the text nearly self-contained. The book is suitable for graduate students. A Primer on Mapping Class Groups begins by explaining the main group-theoretical properties of $\text{Mod}(S)$, from finite generation by Dehn twists and low-dimensional homology to the Dehn-Nielsen-Baer theorem. Along the way, central objects and tools are introduced, such as the Birman exact sequence, the complex of curves, the braid group, the symplectic representation, and the Torelli group. The book then introduces Teichmüller space and its geometry, and uses the action of $\text{Mod}(S)$ on it to prove the Nielsen-Thurston classification of surface homeomorphisms. Topics include the topology of the moduli space of Riemann surfaces, the connection with surface bundles, pseudo-Anosov theory, and Thurston's approach to the classification.

primer of mapping class groups: A Primer on Mapping Class Groups Benson Farb, Dan Margalit, 2012 The study of the mapping class group $\text{Mod}(S)$ is a classical topic that is experiencing a renaissance. It lies at the juncture of geometry, topology, and group theory. This book explains as many important theorems, examples, and techniques as possible, quickly and directly, while at the same time giving full details and keeping the text nearly self-contained. The book is suitable for graduate students. A Primer on Mapping Class Groups begins by explaining the main group-theoretical properties of $\text{Mod}(S)$, from finite generation by Dehn twists and low-dimensional homology to the Dehn-Nielsen-Baer theorem. Along the way, central objects and tools are introduced, such as the Birman exact sequence, the complex of curves, the braid group, the symplectic representation, and the Torelli group. The book then introduces Teichmüller space and its geometry, and uses the action of $\text{Mod}(S)$ on it to prove the Nielsen-Thurston classification of surface homeomorphisms. Topics include the topology of the moduli space of Riemann surfaces, the connection with surface bundles, pseudo-Anosov theory, and Thurston's approach to the classification.

primer of mapping class groups: Problems on Mapping Class Groups and Related Topics Benson Farb, 2006-09-12 The appearance of mapping class groups in mathematics is ubiquitous. The

book presents 23 papers containing problems about mapping class groups, the moduli space of Riemann surfaces, Teichmüller geometry, and related areas. Each paper focusses completely on open problems and directions. The problems range in scope from specific computations, to broad programs. The goal is to have a rich source of problems which have been formulated explicitly and accessibly. The book is divided into four parts. Part I contains problems on the combinatorial and (co)homological group-theoretic aspects of mapping class groups, and the way in which these relate to problems in geometry and topology. Part II concentrates on connections with classification problems in 3-manifold theory, the theory of symplectic 4-manifolds, and algebraic geometry. A wide variety of problems, from understanding billiard trajectories to the classification of Kleinian groups, can be reduced to differential and synthetic geometry problems about moduli space. Such problems and connections are discussed in Part III. Mapping class groups are related, both concretely and philosophically, to a number of other groups, such as braid groups, lattices in semisimple Lie groups, and automorphism groups of free groups. Part IV concentrates on problems surrounding these relationships. This book should be of interest to anyone studying geometry, topology, algebraic geometry or infinite groups. It is meant to provide inspiration for everyone from graduate students to senior researchers.

primer of mapping class groups: Hochschild Cohomology, Modular Tensor Categories, and Mapping Class Groups I Simon Lentner, Svea Nora Mierach, Christoph Schweigert, Yorck Sommerhäuser, 2023-07-25 The book addresses a key question in topological field theory and logarithmic conformal field theory: In the case where the underlying modular category is not semisimple, topological field theory appears to suggest that mapping class groups do not only act on the spaces of chiral conformal blocks, which arise from the homomorphism functors in the category, but also act on the spaces that arise from the corresponding derived functors. It is natural to ask whether this is indeed the case. The book carefully approaches this question by first providing a detailed introduction to surfaces and their mapping class groups. Thereafter, it explains how representations of these groups are constructed in topological field theory, using an approach via nets and ribbon graphs. These tools are then used to show that the mapping class groups indeed act on the so-called derived block spaces. Toward the end, the book explains the relation to Hochschild cohomology of Hopf algebras and the modular group.

primer of mapping class groups: Proceedings Of The International Congress Of Mathematicians 2010 (Icm 2010) (In 4 Volumes) - Vol. I: Plenary Lectures And Ceremonies, Vols. II-IV: Invited Lectures Rajendra Bhatia, Arup Pal, G Rangarajan, V Srinivas, M Vanninathan, 2011-06-06 ICM 2010 proceedings comprises a four-volume set containing articles based on plenary lectures and invited section lectures, the Abel and Noether lectures, as well as contributions based on lectures delivered by the recipients of the Fields Medal, the Nevanlinna, and Chern Prizes. The first volume will also contain the speeches at the opening and closing ceremonies and other highlights of the Congress.

primer of mapping class groups: Moduli Spaces of Riemann Surfaces Benson Farb, Richard Hain, Eduard Looijenga, 2013-08-16 Mapping class groups and moduli spaces of Riemann surfaces were the topics of the Graduate Summer School at the 2011 IAS/Park City Mathematics Institute. This book presents the nine different lecture series comprising the summer school, covering a selection of topics of current interest. The introductory courses treat mapping class groups and Teichmüller theory. The more advanced courses cover intersection theory on moduli spaces, the dynamics of polygonal billiards and moduli spaces, the stable cohomology of mapping class groups, the structure of Torelli groups, and arithmetic mapping class groups. The courses consist of a set of intensive short lectures offered by leaders in the field, designed to introduce students to exciting, current research in mathematics. These lectures do not duplicate standard courses available elsewhere. The book should be a valuable resource for graduate students and researchers interested in the topology, geometry and dynamics of moduli spaces of Riemann surfaces and related topics. Titles in this series are co-published with the Institute for Advanced Study/Park City Mathematics Institute. Members of the Mathematical Association of America (MAA) and the National Council of

Teachers of Mathematics (NCTM) receive a 20% discount from list price.

primer of mapping class groups: *Office Hours with a Geometric Group Theorist* Matt Clay, Dan Margalit, 2017-07-11 Geometric group theory is the study of the interplay between groups and the spaces they act on, and has its roots in the works of Henri Poincaré, Felix Klein, J.H.C. Whitehead, and Max Dehn. *Office Hours with a Geometric Group Theorist* brings together leading experts who provide one-on-one instruction on key topics in this exciting and relatively new field of mathematics. It's like having office hours with your most trusted math professors. An essential primer for undergraduates making the leap to graduate work, the book begins with free groups—actions of free groups on trees, algorithmic questions about free groups, the ping-pong lemma, and automorphisms of free groups. It goes on to cover several large-scale geometric invariants of groups, including quasi-isometry groups, Dehn functions, Gromov hyperbolicity, and asymptotic dimension. It also delves into important examples of groups, such as Coxeter groups, Thompson's groups, right-angled Artin groups, lamplighter groups, mapping class groups, and braid groups. The tone is conversational throughout, and the instruction is driven by examples. Accessible to students who have taken a first course in abstract algebra, *Office Hours with a Geometric Group Theorist* also features numerous exercises and in-depth projects designed to engage readers and provide jumping-off points for research projects.

primer of mapping class groups: Geometric Group Theory Mladen Bestvina, Michah Sageev, Karen Vogtmann, 2014-12-24 Geometric group theory refers to the study of discrete groups using tools from topology, geometry, dynamics and analysis. The field is evolving very rapidly and the present volume provides an introduction to and overview of various topics which have played critical roles in this evolution. The book contains lecture notes from courses given at the Park City Math Institute on Geometric Group Theory. The institute consists of a set of intensive short courses offered by leaders in the field, designed to introduce students to exciting, current research in mathematics. These lectures do not duplicate standard courses available elsewhere. The courses begin at an introductory level suitable for graduate students and lead up to currently active topics of research. The articles in this volume include introductions to $CAT(0)$ cube complexes and groups, to modern small cancellation theory, to isometry groups of general $CAT(0)$ spaces, and a discussion of nilpotent genus in the context of mapping class groups and $CAT(0)$ groups. One course surveys quasi-isometric rigidity, others contain an exploration of the geometry of Outer space, of actions of arithmetic groups, lectures on lattices and locally symmetric spaces, on marked length spectra and on expander graphs, Property tau and approximate groups. This book is a valuable resource for graduate students and researchers interested in geometric group theory. Titles in this series are co-published with the Institute for Advanced Study/Park City Mathematics Institute. Members of the Mathematical Association of America (MAA) and the National Council of Teachers of Mathematics (NCTM) receive a 20% discount from list price.

primer of mapping class groups: *In the Tradition of Thurston III* Ken'ichi Ohshika, Athanase Papadopoulos, 2024-03-19 William Thurston's ideas have altered the course of twentieth century mathematics, and they continue to have a significant influence on succeeding generations of mathematicians. The purpose of the present volume and of the other volumes in the same series is to provide a collection of articles that allows the reader to learn the important aspects of Thurston's heritage. The topics covered in this volume include Kleinian groups, holomorphic motions, earthquakes from the Anti-de Sitter point of view, the Thurston and Weil-Petersson metrics on Teichmüller space, 3-manifolds, geometric structures, dynamics on surfaces, homeomorphism groups of 2-manifolds and the theory of orbifolds.

primer of mapping class groups: *Lectures on Geometry* Nicholas Michael John Woodhouse, 2017 This book contains a series of chapters by leading researchers and practitioners on community engagement approaches in the field of counterterrorism and counterinsurgency. It presents existing and emerging community engagement models in various parts of the world which could serve as effective models for governments keen to work with community leaders to manage and reduce the terrorist threat. The book emphasizes the strength of communities as central to government

approaches in countering violent extremism.

primer of mapping class groups: *Computational Algebraic and Analytic Geometry* Mika Seppälä, Emil Volcheck, 2012 This volume contains the proceedings of three AMS Special Sessions on Computational Algebraic and Analytic Geometry for Low-Dimensional Varieties held January 8, 2007, in New Orleans, LA; January 6, 2009, in Washington, DC; and January 6, 2011, in New Orleans, LA. Algebraic, analytic, and geometric methods are used to study algebraic curves and Riemann surfaces from a variety of points of view. The object of the study is the same. The methods are different. The fact that a multitude of methods, stemming from very different mathematical cultures, can be used to study the same objects makes this area both fascinating and challenging.

primer of mapping class groups: *Mirzakhani's Curve Counting and Geodesic Currents* Viveka Erlandsson, Juan Souto, 2022-09-20 This monograph presents an approachable proof of Mirzakhani's curve counting theorem, both for simple and non-simple curves. Designed to welcome readers to the area, the presentation builds intuition with elementary examples before progressing to rigorous proofs. This approach illuminates new and established results alike, and produces versatile tools for studying the geometry of hyperbolic surfaces, Teichmüller theory, and mapping class groups. Beginning with the preliminaries of curves and arcs on surfaces, the authors go on to present the theory of geodesic currents in detail. Highlights include a treatment of cusped surfaces and surfaces with boundary, along with a comprehensive discussion of the action of the mapping class group on the space of geodesic currents. A user-friendly account of train tracks follows, providing the foundation for Radam's, an immersed variation. From here, the authors apply these tools to great effect, offering simplified proofs of existing results and a new, more general proof of Mirzakhani's curve counting theorem. Further applications include counting square-tiled surfaces and mapping class group orbits, and investigating random geometric structures. Mirzakhani's Curve Counting and Geodesic Currents introduces readers to powerful counting techniques for the study of surfaces. Ideal for graduate students and researchers new to the area, the pedagogical approach, conversational style, and illuminating illustrations bring this exciting field to life. Exercises offer opportunities to engage with the material throughout. Basic familiarity with 2-dimensional topology and hyperbolic geometry, measured laminations, and the mapping class group is assumed.

primer of mapping class groups: *Handbook of Teichmüller Theory* Athanase Papadopoulos, 2007 The subject of this handbook is Teichmüller theory in a wide sense, namely the theory of geometric structures on surfaces and their moduli spaces. This includes the study of vector bundles on these moduli spaces, the study of mapping class groups, the relation with 3-manifolds, the relation with symmetric spaces and arithmetic groups, the representation theory of fundamental groups, and applications to physics. Thus the handbook is a place where several fields of mathematics interact: Riemann surfaces, hyperbolic geometry, partial differential equations, several complex variables, algebraic geometry, algebraic topology, combinatorial topology, low-dimensional topology, theoretical physics, and others. This confluence of ideas toward a unique subject is a manifestation of the unity and harmony of mathematics. This volume contains surveys on the fundamental theory as well as surveys on applications to and relations with the fields mentioned above. It is written by leading experts in these fields. Some of the surveys contain classical material, while others present the latest developments of the theory as well as open problems. This volume is divided into the following four sections: The metric and the analytic theory The group theory The algebraic topology of mapping class groups and moduli spaces Teichmüller theory and mathematical physics This handbook is addressed to graduate students and researchers in all the fields mentioned.

primer of mapping class groups: *Nine Mathematical Challenges: An Elucidation* A. Kechris, N. Makarov, D. Ramakrishnan, X. Zhu, 2021-09-24 This volume stems from the Linde Hall Inaugural Math Symposium, held from February 22–24, 2019, at California Institute of Technology, Pasadena, California. The content isolates and discusses nine mathematical problems, or sets of problems, in a deep way, but starting from scratch. Included among them are the well-known problems of the classification of finite groups, the Navier-Stokes equations, the Birch and Swinnerton-Dyer conjecture, and the continuum hypothesis. The other five problems, also of

substantial importance, concern the Lieb–Thirring inequalities, the equidistribution problems in number theory, surface bundles, ramification in covers and curves, and the gap and type problems in Fourier analysis. The problems are explained succinctly, with a discussion of what is known and an elucidation of the outstanding issues. An attempt is made to appeal to a wide audience, both in terms of the field of expertise and the level of the reader.

primer of mapping class groups: Proceedings Of The International Congress Of Mathematicians 2018 (Icm 2018) (In 4 Volumes) Boyan Sirakov, Paulo Ney De Souza, Marcelo Viana, 2019-02-27 The Proceedings of the ICM publishes the talks, by invited speakers, at the conference organized by the International Mathematical Union every 4 years. It covers several areas of Mathematics and it includes the Fields Medal and Nevanlinna, Gauss and Leelavati Prizes and the Chern Medal laudatios.

primer of mapping class groups: Flexibility of Group Actions on the Circle Sang-hyun Kim, Thomas Koberda, Mahan Mj, 2019-01-02 In this partly expository work, a framework is developed for building exotic circle actions of certain classical groups. The authors give general combination theorems for indiscrete isometry groups of hyperbolic space which apply to Fuchsian and limit groups. An abundance of integer-valued subadditive defect-one quasimorphisms on these groups follow as a corollary. The main classes of groups considered are limit and Fuchsian groups. Limit groups are shown to admit large collections of faithful actions on the circle with disjoint rotation spectra. For Fuchsian groups, further flexibility results are proved and the existence of non-geometric actions of free and surface groups is established. An account is given of the extant notions of semi-conjugacy, showing they are equivalent. This book is suitable for experts interested in flexibility of representations, and for non-experts wanting an introduction to group representations into circle homeomorphism groups.

primer of mapping class groups: Thin Groups and Superstrong Approximation Emmanuel Breuillard, Hee Oh, 2014-02-17 This collection of survey articles focuses on recent developments at the boundary between geometry, dynamical systems, number theory and combinatorics.

primer of mapping class groups: In the Tradition of Ahlfors-Bers, VII Ara S. Basmajian, Yair N. Minsky, Alan W. Reid, 2017-08-17 The Ahlfors–Bers Colloquia commemorate the mathematical legacy of Lars Ahlfors and Lipman Bers. The core of this legacy lies in the fields of geometric function theory, Teichmüller theory, hyperbolic geometry, and partial differential equations. Today we see the influence of Ahlfors and Bers on algebraic geometry, mathematical physics, dynamics, probability, geometric group theory, number theory and topology. Recent years have seen a flowering of this legacy with an increased interest in their work. This current volume contains articles on a wide variety of subjects that are central to this legacy. These include papers in Kleinian groups, classical Riemann surface theory, Teichmüller theory, mapping class groups, geometric group theory, and statistical mechanics.

primer of mapping class groups: The Classification of the Virtually Cyclic Subgroups of the Sphere Braid Groups Daciberg Lima Gonçalves, John Guaschi, 2013-09-08 This manuscript is devoted to classifying the isomorphism classes of the virtually cyclic subgroups of the braid groups of the 2-sphere. As well as enabling us to understand better the global structure of these groups, it marks an important step in the computation of the K-theory of their group rings. The classification itself is somewhat intricate, due to the rich structure of the finite subgroups of these braid groups, and is achieved by an in-depth analysis of their group-theoretical and topological properties, such as their centralisers, normalisers and cohomological periodicity. Another important aspect of our work is the close relationship of the braid groups with mapping class groups. This manuscript will serve as a reference for the study of braid groups of low-genus surfaces, and is addressed to graduate students and researchers in low-dimensional, geometric and algebraic topology and in algebra.

primer of mapping class groups: Topological Algebras and their Applications Alexander Katz, 2018-05-07 Proceedings of the 8th International Conference of Topological Algebras and Their Applications (ICTAA-2014), held on May 26-30, 2014 in Playa de Villas de Mar Beach, dedicated to

the memory of Anastasios Mallios (Athens, Greece). This series of conferences started in 1999 in Tartu, Estonia and were subsequently held in Rabat, Morocco (2000), Oulu, Finland (2001), Oaxaca, Mexico (2002), Bedlewo, Poland (2003), Athens, Greece (2005) and Tartu, Estonia (2008 and 2013). The topics of the conference include all areas of mathematics, connected with (preferably general) topological algebras and their applications, including all kinds of topological-algebraic structures as topological linear spaces, topological rings, topological modules, topological groups and semigroups; bornological-algebraic structures such as bornological linear spaces, bornological algebras, bornological groups, bornological rings and modules; algebraic and topological K-theory; topological module bundles, sheaves and others. Contents Some results on spectral properties of unital algebras and on the algebra of linear operators on a unital algebra Descriptions of all closed maximal one-sided ideals in topological algebras On non self-adjoint operators defined by Riesz bases in Hilbert and rigged Hilbert spaces Functional calculus on algebras of operators generated by a self-adjoint operator in Pontryagin space Π_1 On Gelfand-Naimark type Theorems for unital abelian complex and real locally C^* -, and locally JB-algebras Multipliers and strictly real topological algebras Multipliers in some perfect locally m-pseudo-convex algebras Wedderburn structure theorems for two-sided locally m-convex H^* -algebras Homologically best modules in classical and quantized functional analysis Operator Grüss inequality Main embedding theorems for symmetric spaces of measurable functions Mapping class groups are linear Subnormable A-convex algebras Commutative BP^* -algebras and Gelfand-Naimark's theorem Discrete nonclosed subsets in maximally nondiscrete topological groups Faithfully representable topological $*$ -algebras: some spectral properties On continuity of complementors in topological algebras Dominated ergodic theorem for isometries of non-commutative L_p -spaces, $1 \leq p \neq 2$ Ranks and the approximate n -th root property of C^* -algebras Dense ideals in topological algebras: some results and open problems

Related to primer of mapping class groups

Obtener primer y último día del mes, primer día del mes anterior y Quisiera obtener el primer y último día del mes, el primer día del mes anterior y el último día del mes siguiente teniendo en cuenta que escojo el mes en un combobox y el año.

¿Cómo obtener el primer día y el último día del mes actual con C#? Si quieres tener el ultimo día del mes, y ya tienes la fecha, yo utilizo este metodo rápido que es tomar el primer dia de ese mes, sumar un mes y restar un día Por ejemplo new

¿Cómo puedo seleccionar el primer elemento con CSS? Seleccionar el primer div dentro del div con la clase container se puede hacer de diferentes manera: /*seleccionarán el primer hijo div dentro de container y dentro de los hijos de

The Definitive C++ Book Guide and List - Stack Overflow This question attempts to collect the few pearls among the dozens of bad C++ books that are published every year. Unlike many other programming languages, which are often picked up

¿Cómo extraigo el primer campo y último de una tabla en sql server? Tengo una tabla como esta: Y necesito obtener un resultado como este: Es decir, heads únicos seguidos de dos columnas que son la primera fila y última de la columna

Función que devuelve la fecha para el primer día del mes MySQL dispone de la función LAST_DAY(date) que devuelve la fecha para el último día del mes: SELECT LAST_DAY(fecha) AS ultimo_dia FROM table ¿Cómo puedo

obtener Primer y Ultimo día del año en SQL SERVER Como puedo en Sql server siempre obtener el primer y ultimo dia del año. Gracias por el apoyo

Obtener primer registro sin usar subconsultas - Stack Overflow en Estoy tratando de obtener el primer registro que salga en la siguiente consulta SQL: SELECT G305.G305S01 AS SALDO FROM BI_SRC.GSCF300 G300, BI_SRC.GSCF305 G305

Sacar Primer registro completo y último de una tabla en Mysql quería saber como sacar de una tabla en mysql, el primer y el último registro, en una misma consulta, es decir. Tengo esta consulta : SELECT idCounter, substr (date, 1, 10)

Consulta para seleccionar primer registro tanto en PostgreSQL Necesito seleccionar el primer registro de una consulta. Pero el problema es que con top 1 solo me funciona en SQL Server, mas no en PostgreSQL. Y en PostgreSQL me funciona con limit

Obtener primer y último día del mes, primer día del mes anterior y Quisiera obtener el primer y último día del mes, el primer día del mes anterior y el último día del mes siguiente teniendo en cuenta que escojo el mes en un combobox y el año.

¿Cómo obtener el primer día y el último día del mes actual con C#? Si quieres tener el ultimo día del mes, y ya tienes la fecha, yo utilizo este metodo rápido que es tomar el primer dia de ese mes, sumar un mes y restar un día Por ejemplo new

¿Cómo puedo seleccionar el primer elemento con CSS? Seleccionar el primer div dentro del div con la clase container se puede hacer de diferentes manera: /*seleccionarán el primer hijo div dentro de container y dentro de los hijos de

The Definitive C++ Book Guide and List - Stack Overflow This question attempts to collect the few pearls among the dozens of bad C++ books that are published every year. Unlike many other programming languages, which are often picked up

¿Cómo extraigo el primer campo y último de una tabla en sql server? Tengo una tabla como esta: Y necesito obtener un resultado como este: Es decir, heads únicos seguidos de dos columnas que son la primera fila y última de la columna

Función que devuelve la fecha para el primer día del mes MySQL dispone de la función LAST_DAY(date) que devuelve la fecha para el último día del mes: SELECT LAST_DAY(fecha) AS ultimo_dia FROM table ¿Cómo puedo

obtener Primer y Ultimo día del año en SQL SERVER Como puedo en Sql server siempre obtener el primer y ultimo dia del año. Gracias por el apoyo

Obtener primer registro sin usar subconsultas - Stack Overflow en Estoy tratando de obtener el primer registro que salga en la siguiente consulta SQL: SELECT G305.G305S01 AS SALDO FROM BI_SRC.GSCF300 G300, BI_SRC.GSCF305 G305

Sacar Primer registro completo y último de una tabla en Mysql quería saber como sacar de una tabla en mysql, el primer y el último registro, en una misma consulta, es decir. Tengo esta consulta : SELECT idCounter, substr (date, 1, 10)

Consulta para seleccionar primer registro tanto en PostgreSQL Necesito seleccionar el primer registro de una consulta. Pero el problema es que con top 1 solo me funciona en SQL Server, mas no en PostgreSQL. Y en PostgreSQL me funciona con limit

Obtener primer y último día del mes, primer día del mes anterior y Quisiera obtener el primer y último día del mes, el primer día del mes anterior y el último día del mes siguiente teniendo en cuenta que escojo el mes en un combobox y el año.

¿Cómo obtener el primer día y el último día del mes actual con C#? Si quieres tener el ultimo día del mes, y ya tienes la fecha, yo utilizo este metodo rápido que es tomar el primer dia de ese mes, sumar un mes y restar un día Por ejemplo new

¿Cómo puedo seleccionar el primer elemento con CSS? Seleccionar el primer div dentro del div con la clase container se puede hacer de diferentes manera: /*seleccionarán el primer hijo div dentro de container y dentro de los hijos de

The Definitive C++ Book Guide and List - Stack Overflow This question attempts to collect the few pearls among the dozens of bad C++ books that are published every year. Unlike many other programming languages, which are often picked up

¿Cómo extraigo el primer campo y último de una tabla en sql server? Tengo una tabla como esta: Y necesito obtener un resultado como este: Es decir, heads únicos seguidos de dos columnas que son la primera fila y última de la columna

Función que devuelve la fecha para el primer día del mes MySQL dispone de la función LAST_DAY(date) que devuelve la fecha para el último día del mes: SELECT LAST_DAY(fecha) AS ultimo_dia FROM table ¿Cómo puedo

obtener Primer y Ultimo día del año en SQL SERVER Como puedo en Sql server siempre

obtener el primer y ultimo dia del año. Gracias por el apoyo

Obtener primer registro sin usar subconsultas - Stack Overflow en Estoy tratando de obtener el primer registro que salga en la siguiente consulta SQL: SELECT G305.G305S01 AS SALDO FROM BI_SRC.GSCF300 G300, BI_SRC.GSCF305 G305

Sacar Primer registro completo y último de una tabla en Mysql quería saber como sacar de una tabla en mysql, el primer y el último registro, en una misma consulta, es decir. Tengo esta consulta : SELECT idCounter, substr (date, 1, 10)

Consulta para seleccionar primer registro tanto en PostgreSQL Necesito seleccionar el primer registro de una consulta. Pero el problema es que con top 1 solo me funciona en SQL Server, mas no en PostgreSQL. Y en PostgreSQL me funciona con limit

Obtener primer y último día del mes, primer día del mes anterior y Quisiera obtener el primer y último día del mes, el primer día del mes anterior y el último día del mes siguiente teniendo en cuenta que escojo el mes en un combobox y el año.

¿Cómo obtener el primer día y el último día del mes actual con C#? Si quieres tener el ultimo día del mes, y ya tienes la fecha, yo utilizo este metodo rápido que es tomar el primer dia de ese mes, sumar un mes y restar un día Por ejemplo new

¿Cómo puedo seleccionar el primer elemento con CSS? Seleccionar el primer div dentro del div con la clase container se puede hacer de diferentes manera: /*seleccionarán el primer hijo div dentro de container y dentro de los hijos de

The Definitive C++ Book Guide and List - Stack Overflow This question attempts to collect the few pearls among the dozens of bad C++ books that are published every year. Unlike many other programming languages, which are often picked up

¿Cómo extraigo el primer campo y último de una tabla en sql server? Tengo una tabla como esta: Y necesito obtener un resultado como este: Es decir, heads únicos seguidos de dos columnas que son la primera fila y última de la columna

Función que devuelve la fecha para el primer día del mes MySQL dispone de la función LAST_DAY(date) que devuelve la fecha para el último día del mes: SELECT LAST_DAY(fecha) AS ultimo_dia FROM table ¿Cómo puedo

obtener Primer y Ultimo día del año en SQL SERVER Como puedo en Sql server siempre obtener el primer y ultimo dia del año. Gracias por el apoyo

Obtener primer registro sin usar subconsultas - Stack Overflow en Estoy tratando de obtener el primer registro que salga en la siguiente consulta SQL: SELECT G305.G305S01 AS SALDO FROM BI_SRC.GSCF300 G300, BI_SRC.GSCF305 G305

Sacar Primer registro completo y último de una tabla en Mysql quería saber como sacar de una tabla en mysql, el primer y el último registro, en una misma consulta, es decir. Tengo esta consulta : SELECT idCounter, substr (date, 1, 10)

Consulta para seleccionar primer registro tanto en PostgreSQL Necesito seleccionar el primer registro de una consulta. Pero el problema es que con top 1 solo me funciona en SQL Server, mas no en PostgreSQL. Y en PostgreSQL me funciona con limit

Obtener primer y último día del mes, primer día del mes anterior y Quisiera obtener el primer y último día del mes, el primer día del mes anterior y el último día del mes siguiente teniendo en cuenta que escojo el mes en un combobox y el año.

¿Cómo obtener el primer día y el último día del mes actual con C#? Si quieres tener el ultimo día del mes, y ya tienes la fecha, yo utilizo este metodo rápido que es tomar el primer dia de ese mes, sumar un mes y restar un día Por ejemplo new

¿Cómo puedo seleccionar el primer elemento con CSS? Seleccionar el primer div dentro del div con la clase container se puede hacer de diferentes manera: /*seleccionarán el primer hijo div dentro de container y dentro de los hijos de

The Definitive C++ Book Guide and List - Stack Overflow This question attempts to collect the few pearls among the dozens of bad C++ books that are published every year. Unlike many other programming languages, which are often picked up

¿Cómo extraigo el primer campo y último de una tabla en sql server? Tengo una tabla como esta: Y necesito obtener un resultado como este: Es decir, heads únicos seguidos de dos columnas que son la primera fila y última de la columna

Función que devuelve la fecha para el primer día del mes MySQL dispone de la función LAST_DAY(date) que devuelve la fecha para el último día del mes: SELECT LAST_DAY(fecha) AS ultimo_dia FROM table ¿Cómo puedo

obtener Primer y Ultimo día del año en SQL SERVER Como puedo en Sql server siempre obtener el primer y ultimo día del año. Gracias por el apoyo

Obtener primer registro sin usar subconsultas - Stack Overflow en Estoy tratando de obtener el primer registro que salga en la siguiente consulta SQL: SELECT G305.G305S01 AS SALDO FROM BI_SRC.GSCF300 G300, BI_SRC.GSCF305 G305

Sacar Primer registro completo y último de una tabla en Mysql quería saber como sacar de una tabla en mysql, el primer y el último registro, en una misma consulta, es decir. Tengo esta consulta : SELECT idCounter, substr (date, 1, 10)

Consulta para seleccionar primer registro tanto en PostgreSQL Necesito seleccionar el primer registro de una consulta. Pero el problema es que con top 1 solo me funciona en SQL Server, mas no en PostgreSQL. Y en PostgreSQL me funciona con limit

Obtener primer y último día del mes, primer día del mes anterior y Quisiera obtener el primer y último día del mes, el primer día del mes anterior y el último día del mes siguiente teniendo en cuenta que escojo el mes en un combobox y el año.

¿Cómo obtener el primer día y el último día del mes actual con C#? Si quieres tener el ultimo día del mes, y ya tienes la fecha, yo utilizo este metodo rápido que es tomar el primer dia de ese mes, sumar un mes y restar un día Por ejemplo new

¿Cómo puedo seleccionar el primer elemento con CSS? Seleccionar el primer div dentro del div con la clase container se puede hacer de diferentes manera: /*seleccionarán el primer hijo div dentro de container y dentro de los hijos de

The Definitive C++ Book Guide and List - Stack Overflow This question attempts to collect the few pearls among the dozens of bad C++ books that are published every year. Unlike many other programming languages, which are often picked up

¿Cómo extraigo el primer campo y último de una tabla en sql server? Tengo una tabla como esta: Y necesito obtener un resultado como este: Es decir, heads únicos seguidos de dos columnas que son la primera fila y última de la columna

Función que devuelve la fecha para el primer día del mes MySQL dispone de la función LAST_DAY(date) que devuelve la fecha para el último día del mes: SELECT LAST_DAY(fecha) AS ultimo_dia FROM table ¿Cómo puedo

obtener Primer y Ultimo día del año en SQL SERVER Como puedo en Sql server siempre obtener el primer y ultimo día del año. Gracias por el apoyo

Obtener primer registro sin usar subconsultas - Stack Overflow en Estoy tratando de obtener el primer registro que salga en la siguiente consulta SQL: SELECT G305.G305S01 AS SALDO FROM BI_SRC.GSCF300 G300, BI_SRC.GSCF305 G305

Sacar Primer registro completo y último de una tabla en Mysql quería saber como sacar de una tabla en mysql, el primer y el último registro, en una misma consulta, es decir. Tengo esta consulta : SELECT idCounter, substr (date, 1, 10)

Consulta para seleccionar primer registro tanto en PostgreSQL Necesito seleccionar el primer registro de una consulta. Pero el problema es que con top 1 solo me funciona en SQL Server, mas no en PostgreSQL. Y en PostgreSQL me funciona con limit

Obtener primer y último día del mes, primer día del mes anterior y Quisiera obtener el primer y último día del mes, el primer día del mes anterior y el último día del mes siguiente teniendo en cuenta que escojo el mes en un combobox y el año.

¿Cómo obtener el primer día y el último día del mes actual con C#? Si quieres tener el ultimo día del mes, y ya tienes la fecha, yo utilizo este metodo rápido que es tomar el primer dia de

ese mes, sumar un mes y restar un día Por ejemplo new

¿Cómo puedo seleccionar el primer elemento con CSS? Seleccionar el primer div dentro del div con la clase container se puede hacer de diferentes maneras: /*seleccionarán el primer hijo div dentro de container y dentro de los hijos de

The Definitive C++ Book Guide and List - Stack Overflow This question attempts to collect the few pearls among the dozens of bad C++ books that are published every year. Unlike many other programming languages, which are often picked up

¿Cómo extraigo el primer campo y último de una tabla en sql server? Tengo una tabla como esta: Y necesito obtener un resultado como este: Es decir, heads únicos seguidos de dos columnas que son la primera fila y última de la columna

Función que devuelve la fecha para el primer día del mes MySQL dispone de la función LAST_DAY(date) que devuelve la fecha para el último día del mes: SELECT LAST_DAY(fecha) AS ultimo_dia FROM table ¿Cómo puedo

obtener Primer y Ultimo día del año en SQL SERVER Como puedo en Sql server siempre obtener el primer y ultimo día del año. Gracias por el apoyo

Obtener primer registro sin usar subconsultas - Stack Overflow en Estoy tratando de obtener el primer registro que salga en la siguiente consulta SQL: SELECT G305.G305S01 AS SALDO FROM BI_SRC.GSCF300 G300, BI_SRC.GSCF305 G305

Sacar Primer registro completo y último de una tabla en Mysql quería saber como sacar de una tabla en mysql, el primer y el último registro, en una misma consulta, es decir. Tengo esta consulta : SELECT idCounter, substr (date, 1, 10)

Consulta para seleccionar primer registro tanto en PostgreSQL Necesito seleccionar el primer registro de una consulta. Pero el problema es que con top 1 solo me funciona en SQL Server, mas no en PostgreSQL. Y en PostgreSQL me funciona con limit

Related to primer of mapping class groups

The p-Periodicity of the Mapping Class Group and the Estimate of its p-Period (JSTOR Daily2y) We determine completely the primes p for which the Farrell-Tate cohomology of the mapping class group Γ_g is p -periodic. We also estimate the p -period of a p -periodic Γ_g . Journal Information This

The p-Periodicity of the Mapping Class Group and the Estimate of its p-Period (JSTOR Daily2y) We determine completely the primes p for which the Farrell-Tate cohomology of the mapping class group Γ_g is p -periodic. We also estimate the p -period of a p -periodic Γ_g . Journal Information This

Quasi-Homomorphisms and Stable Lengths in Mapping Class Groups (JSTOR Daily7y) This is a preview. Log in through your library . Abstract We give elementary applications of quasi-homomorphisms to growth problems in groups. A particular case concerns the number of torsion elements

Quasi-Homomorphisms and Stable Lengths in Mapping Class Groups (JSTOR Daily7y) This is a preview. Log in through your library . Abstract We give elementary applications of quasi-homomorphisms to growth problems in groups. A particular case concerns the number of torsion elements

Back to Home: <https://www-01.massdevelopment.com>