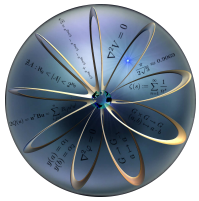

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Overview article for algebraic topology

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1 An Overview of Algebraic Topology topics

1.1 Introduction

Algebraic topology (AT) utilizes algebraic approaches to solve topological problems, such as the classification of surfaces, proving duality theorems for manifolds and approximation theorems for topological spaces. A central problem in algebraic topology is to find algebraic invariants of topological spaces, which is usually carried out by means of homotopy, homology and cohomology groups. There are close connections between algebraic topology, `http://planetmath.org/AlgebraicGeometry`Algebraic Geometry (AG), and Non-commutative Geometry/NAAT. On the other hand, there are also close ties between algebraic geometry and number theory.

1.2 Outline

1. Homotopy theory and fundamental groups
2. Topology and groupoids; `http://planetmath.org/VanKampensTheorem`van Kampen theorem
3. Homology and cohomology theories
4. Duality
5. Category theory applications in algebraic topology
6. Index of categories, functors and natural transformations
7. `http://www.uclouvain.be/17501.html`Grothendieck's Descent theory
8. 'Anabelian geometry'
9. Categorical Galois theory
10. Higher dimensional algebra (HDA)
11. Quantum algebraic topology (QAT)
12. Quantum Geometry
13. Non-Abelian algebraic topology (NAAT)

1.3 Homotopy theory and fundamental groups

1. Homotopy
2. Fundamental group of a space
3. Fundamental theorems
4. van Kampen theorem
5. Whitehead groups, torsion and towers
6. Postnikov towers

1.4 Topology and Groupoids

1. Topology definition, axioms and basic concepts
2. Fundamental groupoid
3. Topological groupoid
4. Classifying space
5. van Kampen theorem for groupoids
6. Groupoid pushout theorem
7. Double groupoids and crossed modules
8. new4

1.5 Homology theory

1. Homology group
2. Homology sequence
3. Homology complex
4. Homological Algebra

1.6 Cohomology theory

1. Cohomology group
2. Cohomology sequence
3. DeRham cohomology
4. new4

1.7 Non-Abelian Algebraic Topology

1. Crossed Complexes
2. Modules
3. Cross-modules
4. Omega-Groupoids
5. Double Groupoids: Homotopy Double Groupoid of a Hausdorff Space
6. Double Category
7. Groupoid Category
8. Algebroids
9. Higher Homotopy van Kampen Theorem

...more to come