

TYPICAL TOPICS FOR THE FIRST EXAMINATION IN TOPOLOGY

The emphasis in the topology first examination may vary somewhat from year to year. To prepare for it, one should become familiar with the topics listed below, together with related examples and applications. The examination will not necessarily contain questions from all the listed topics, and the topology course may cover some more specialized additional topics.

TOPICS THAT MAY BE COVERED ON THE EXAM

General Topology

Topological spaces and continuous maps: compactness; connectedness; path-connectedness; convergence; separation axioms; product topology, including the Tychonoff product theorem; quotient topology; mapping spaces; Urysohn theorem; Tietze extension theorem. Metric spaces: completeness; Baire category theorem; Arzela-Ascoli theorem.

Homotopy Theory

Homotopy of maps; the fundamental group; Siefert-van Kampen theorem and applications; covering space theory and applications.

Homology Theory

Singular homology theory; Eilenberg-Steenrod axioms; Mayer-Vietoris theorem; homology of CW-complexes; Universal coefficient theorem; Kunnet theorem. Applications of homology theory: Brouwer fixed point theorem; Lefschetz fixed point theorem; Jordan-Brouwer theorem.