Topology Qualifying Exam Study Guide

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> The weight of topics on the exam should be about 1/3 general topology and 2/3 algebraic topology.

General Topology

- Topological spaces, continuous functions, product and quotient topology [1, ch. 2]
- Connectedness and compactness [1, ch. 3]
- Countability and separation axioms, Urysohn lemma, Tietze theorem [1, ch. 4, except §36]
- Complete metric spaces and function spaces [1, §43, 45]

Algebraic Topology

- Classification of surfaces [2, ch. I]
- Fundamental group [2, ch. II], [3, §1.1]
- van Kampen's theorem [2, ch. III, IV], [3, §1.2]
- Classification of covering spaces [2, ch. V], [3 §1.3]

Homology:

- Simplicial, singular, cellular; computations and applications [3, ch. 2], [4, ch. 4]
- Degree of a map $S^n \to S^n$ [3, p. 134], [4, §21]
- Euler characteristic [3, p. 146]
- Lefschetz fixed point theorem [3, p. 179], [4, §22]

References

- [1] J. Munkres, Topology , second edition, Prentice-Hall, 2000.
- [2] W. Massey, A Basic Course in Algebraic Topology , Springer-Verlag, 1991.
- [3] A. Hatcher, Algebraic Topology , Cambridge U. Press, 2002.
  - Revisions and corrections http://www.math.cornell.edu/~hatcher/AT/ATpage.html
- [4] J. Munkres, Elements of Algebraic Topology , Addison-Wesley, 1984.