

Mathematics 205A
Introduction to Topology — I
Course Notes — Part Two
Revised, Fall 2014

Department of Mathematics
University of California, Riverside

Table of Contents

Introduction	iii
Prerequisites	v
VII. Topological deformations and approximations	1
1. Homotopic mappings	2
2. Some examples	4
3. Homotopy classes of mappings	7
4. Homotopy types	10
VIII. The fundamental group	13
0. Default hypotheses	14
1. Definitions and basic properties	14
2. Important special cases	20
3. Covering spaces	27
4. Fundamental groups of spheres	31
5. Simply connected spaces	34
6. Homotopy of paths and line integrals	39
IX. Computing fundamental groups	52
1. Free groups	55
2. Sums and pushouts of groups	57
3. The Seifert-van Kampen Theorem	66
4. Examples and computations	72
<i>Appendices:</i>	
A. Topological equivalence of disks and hypercubes	84
B. Topological manifolds	85
C. Fiber spaces and fundamental groups	95