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HATCHER'S ALGEBRAIC TOPOLOGY SOLUTIONS REID

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MONROE HARRIS Van Kampen's Theorem Problem 1. Suppose  $G$  and  $H$  nontrivial groups. Suppose  $x = g_1 h_1 \cdots g_n h_n$  lies in the center of  $G * H$ , where  $g_i \in G$  and  $h_i \in H$ . For any  $g \in G$ , we have  $g g_1 h_1 \cdots g_n h_n g^{-1} = g_1 h_1 \cdots g_n h_n g^{-1} g_1 h_1 \cdots g_n h_n = g_1 h_1 \cdots g_n h_n g^{-1} g_1 h_1 \cdots g_n h_n = g_1 h_1 \cdots g_n h_n g^{-1} g_1 h_1 \cdots g_n h_n = 1$ . The only way for this to be true for all  $g$  is if  $h_i = 1$  for all  $i$ .

## Van Kampen's Theorem

Allen Hatcher's Algebraic Topology, available for free download here. Our course will primarily use Chapters 0, 1, 2, and 3. Prerequisites. In addition to formal prerequisites, we will use a number of notions and concepts without much explanation.

## Math 215A: Algebraic Topology

Solutions to Homework # 2 Hatcher, Chap. 0, Problem 16.1 Let  $R_1 := \mathbb{R}^n$ ,  $R = \mathbb{R}^n \sim x = (x_k)_{k=1}^n$ ;  $\mathbb{R}^n$ :  $x_n = 0$ ;  $\mathbb{R}^n$ ,  $\mathbb{R}^n$ : We define a topology on  $R_1$  by declaring a set  $S \subseteq R_1$  closed if and only if,  $\mathbb{R}^n$ ,  $0$ , the intersection  $S \cap R_n$  of with the finite dimensional subspace  $R_n = \{ (x_k)_{k=1}^n; x_k = 0; k > n \}$ ; is closed in the Euclidean topology of  $R_n$ . For each  $x \in R_1$  set  $j \sim x_j := \{x_k; k=0, x_2, k$

Solutions to Homework # 1 Hatcher, Chap. 0, Problem 4.

Solutions to Alan Hatcher's "Algebraic Topology" Allen Hatcher's Algebraic Topology, available for free download here. Our course will primarily use Chapters 0, 1, 2, and 3. Prerequisites. In addition to formal prerequisites, we will use a number of notions and concepts without much explanation. Preface - Cornell University

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ALLEN HATCHER: ALGEBRAIC TOPOLOGY MORTEN POULSEN All references are to the 2002 printed edition. Chapter 0 Ex. 0.2. Define  $H: (R^n - \{0\}) \times I \rightarrow R^n - \{0\}$  by  $H(x,t) = (1-t)x + t|x|x$ ,  $x \in R^n - \{0\}$ ,  $t \in I$ . It is easily verified that  $H$  is a homotopy between the identity map and a retraction onto  $S^{n-1}$ , i.e. a deformation retraction. Ex. 0.3.

Allen Hatcher: Algebraic Topology

A downloadable textbook in algebraic topology.

What's in the Book? To get an idea you can look at the Table of Contents and the Preface.. Printed Version:

The book was published by Cambridge University Press in 2002 in both paperback and hardback editions, but only the paperback version is currently available (ISBN 0-521-79540-0). I have tried very hard to keep the price of the paperback ...

Algebraic Topology Book - Cornell University

By Lemma 1.15 (Hatcher), every loop in  $X$  based at  $x_0$  is homotopic to a product of loops, where each loop is either contained in  $e$  or  $A$ . Since  $n \geq 2$ , a loop contained in  $e$  is nullhomotopic, so every loop in  $X$  is homotopic to a loop in  $A$ . Thus if  $[f] \in \pi_1(X; x_0)$ , there is a loop  $f_0: I \rightarrow A$  such that  $[f_0] = [f]$ . We have  $f_0 = f_0$ , so  $[f_0] = [f_0] = [f_0] = [f]$

Homework 3 MTH 869 Algebraic Topology

Algebraic Topology. This book, published in 2002, is a beginning graduate-level textbook on algebraic topology from a fairly classical point of view. To find out more or to download it in electronic form, follow

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this link to the download page.

Allen Hatcher's Homepage - Cornell University  
Math 634: Algebraic Topology I, Fall 2015 Solutions to Homework #3 Exercises from Hatcher: Chapter 1.2, Problems 4, 7, 8, 9, 14, 15, 21 (Y path-connected). 4. If  $X$  is the union of  $n$  lines through the origin in  $\mathbb{R}^3$ , then  $\mathbb{R}^3 \setminus X$  admits a deformation retraction to the complement of  $n$  points in  $S^2$ , which is homeomorphic to the complement of  $n - 1$  points in  $\mathbb{R}^2$ . This in turn admits a deformation retraction to a wedge of  $n - 1$  circles, so  $\check{\pi}_1$

Math 634: Algebraic Topology I, Fall 2015 Solutions to ...

Allen Hatcher. In most major universities one of the three or four basic first-year graduate mathematics courses is algebraic topology. This introductory text is suitable for use in a course on the subject or for self-study, featuring broad coverage and a readable exposition, with many examples and exercises. The four main chapters present the basics: fundamental group and covering spaces, homology and cohomology, higher homotopy groups, and homotopy theory generally.

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Algebraic Topology, Semester 1, 2015, Zhou Zhang  
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Weeks 2-7: Chapter 1, Fundamental Group Weeks  
7-13: Chapter 2, Homology Week 13: Wrap-up Before  
We Start The struggle between intuitive idea and

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rigorous ...

Following Chapters 0, 1 and 2 in Algebraic Topology by ...

Text: We will mostly follow chapters 3 and 4 of Algebraic Topology by Allen Hatcher. The book is available for free online at the author's website. as well as in print. Grades: The grade will be based on homework assignments. Homework: A list of the homework problems will be kept on this webpage.

Algebraic Topology 246A - Winter 2018

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Solutions in Hatcher's Algebraic Topology; selected exercises from Chapters 0, 2, and 3 . Totally Indescribable; Totally Indescribable. Projects. Math. @cemulate. Algebraic Topology Allen Hatcher. Chapter 0 . Exercise 16 The infinite sphere is contractible Chapter 2 . Exercise 1.1 Exhibiting a Mobius strip a a quotient of a two-simplex

Algebraic Topology

Consider the homotopy  $g_t = f \circ \phi_t : S_{n-1} \rightarrow B$ . Then we lift the homotopy  $g_t$  up to a homotopy  $\tilde{g}_t :$

$S_{n-1} \rightarrow E$  by applying the CHP. The homotopy  $\tilde{g}_t$  may be considered as a map  $\tilde{h} : D_n \rightarrow E$ , where the disk

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$D^n$  is covered by  $(n-1)$ -spheres as it is shown, see Fig. 9.7 (b), and the map  $h$  on these spheres is given by  $\tilde{g}$ .

## NOTES ON THE COURSE "ALGEBRAIC TOPOLOGY"

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ISBN 0 521 23161 2 hard covers ISBN 0 521 29840 7  
paperback. INTRODUCTION Most of this book is based  
on lectures to third-year undergraduate and  
postgraduate students. It aims to provide a thorough  
grounding in the more elementary parts of algebraic  
topology, although

ALGEBRAIC TOPOLOGY - School of Mathematics  
Topology - Discussion Homework 2 September 8,  
2016 1-6 How many faces does an  $n$ -simplex have?  
Solution: Let  $n$  be an  $n$ -simplex. Since  $n$  has  $n+1$   
 $+1$  vertices, there are  $n+1$  0-faces of  $n$ . Likewise,  $n$  has  
 $n+1$  1-faces. In general, we can say that the  
number of  $(k-1)$ -faces is  $n+1-k$ . So, we have  $\sum_{k=1}^{n+1} (n+1-k)$   
 $n+1-k$  total faces of  $n$ . 1-8 Triangulation of the Klein  
Bottle.  $a_0 = 2$   $a_1 = 0$   $a_2 = 3$   $a_3 = 5$   $a_4 = 3$

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