

## Corrections to the book *Algebraic Topology* by Allen Hatcher

Some of these are more in the nature of clarifications than corrections.

- Example 0.15, next-to-last line: Change “closure of  $X - N$ ” to “ $X - h(M_f - Z)$ ”
- Proof of 0.19. The fourth line should say that  $(Y, A)$  has the homotopy extension property, rather than  $(X, A)$ .
- §1.3, page 65, line 12. Change “cover space” to “covering space”
- §1.3, Exercise 3. Add the hypothesis that the covering space  $p: \tilde{X} \rightarrow X$  is surjective.
- §2.1, page 127. In the discussion of naturality two-thirds of the way down the page the maps  $\alpha$ ,  $\beta$ , and  $\gamma$  should be assumed to be chain maps.
- §2.2, page 135, last line. Add the nontriviality condition  $n > 0$ , to guarantee that the groups  $H_n(S^n)$  in the diagram on the next page are  $\mathbb{Z}$ .
- §2.2, page 137, line 6. Change the word “stretching” to “shrinking.”
- §2.3, page 164. There is evidently something wrong with the syntax of the long sentence beginning on line 8 of this page, the second example of a functor. The simplest correction would be to change the word “assigns” to “assigning” in line 8. Perhaps a better fix would be to break this long sentence into two sentences by putting a period at the end of line 9 and then starting a new sentence on line 10 with “This is a functor from the category  $\dots$ ”.
- §3.2, page 218, last line of second paragraph: Change the first  $Y$  to  $X$ , so that the tensor product becomes  $H^*(X; R) \otimes_R H^*(Y; R)$ .
- §3.2, Proposition 3.22 and Exercise 17. The proof of the proposition for  $n$  odd is left to the reader as Exercise 17, with the comment that it is similar to the case  $n$  even. However, the case  $n$  odd seems to be significantly more difficult if one tries to follow the same procedure of using the quotient map  $(S^n)^m \rightarrow J_m(S^n)$ . A simpler approach when  $n$  is odd is to consider instead the natural quotient map  $q: S^n \times S^n \times J_{2k-1}(S^n) \rightarrow J_{2k+1}(S^n)$  and use induction on  $k$ .
- §3.3, page 236. In the sixth line of the longish paragraph between Theorem 3.26 and Lemma 3.27, change the phrase “for  $B$  any open ball in  $M$ ” to “for  $B$  any open ball in  $M$  containing  $x$ .”
- §3.3, page 239, next-to-last line: Change “ $(k - \ell)$ -simplex” to “ $(k - \ell)$ -chain”
- §3.3, page 242. In line 5 of the subsection *Cohomology with Compact Supports* change “chain group” to “cochain group.”
- §3.3. In the diagram preceding Theorem 3.35 in the middle of page 245 the two vertical arrows are pointing in the wrong direction. (Stupid mistake!!)
- §3.3, page 248. In the next-to-last line of item (1) in the proof of Poincaré Duality, change “the cocycle taking” to “a cocycle  $\varphi$  taking”

- §3.B, page 272, first line. Change “for all  $i$ ” to “for all  $n$ ”
- §4.2, page 374. Delete the direct sum symbol  $\oplus$  at the end of the displayed exact sequence in the sixth line.
- §4.B, page 428, line 6. Typo: Replace Adam’ by Adams’.
- §4.F, page 454. In the last paragraph it is stated that one can associate a cohomology theory to any spectrum by setting  $h^i(X) = \varinjlim \langle \Sigma^n X, K_{n+i} \rangle$ . Unfortunately the wedge axiom fails with this definition. For finite wedges there is no problem, so one does get a cohomology theory for finite CW complexes. A way to avoid this problem is to associate an  $\Omega$ -spectrum to a given spectrum in the way explained on the next page, then take the cohomology theory associated to this  $\Omega$ -spectrum.
- §4.L. Throughout this section the name Adem is mistakenly written with an accent, as Adém. (In fact the name is pronounced with the accent on the first syllable.)