

Algebraic Topology - Spring 2013 - Assignment Number 4.  
Problems 1. and 2. are due on Wednesday, March 20.  
Problem 3. is due on Friday, April 5, 2013.

1. Hatcher. Page 228. Problems 1,3,5,6,7,18.
2. Examine the derivation of the fundamental group  $G$  of the Poincare Homology sphere (the dodecahedral space) in the scan from Seifert and Threlfall on the website. Rewrite this derivation in your own terms and justify all the steps in your derivation. Prove that the group  $G$  has 120 elements.
3. Read pages 1 - 34 of the "Cohomology Operations" lectures by N. E. Steenrod, available on the website. Take careful notes and find references and definitions for all terms that you do not already know. Make sure you understand the statements of all theorems in the notes and work out to the best of your ability proofs of all the results derived in these notes. Write a report on your work that includes as complete an account as you can create of the construction and application of the Steenrod squaring operations.