

## Math 540: Exercises for Week 8

Reading: Hatcher Section 2.1

1. Hatcher 2.1.14
2. Hatcher 2.1.17
3. Hatcher 2.1.20 and 2.1.21 [These are really two parts of the same problem.]
4. Hatcher 2.1.22
5. Hatcher 2.1.29
6. If you haven't seen it before, read the statement of the Five Lemma on page 129 and prove it for yourself before looking at Hatcher's argument.
7. If you haven't seen it before, read the statement of the Splitting Lemma on page 147 of Hatcher and prove it for yourself before looking at Hatcher's argument.
8. Prove that a short exact sequence of abelian groups in which  $C$  is free always splits. (This fact is very useful for computations.)