

Math 540: Exercises for Week 4

Reading: Hatcher Section 1.2-3

1. Hatcher 1.1.16 [If you're doing a proper subset of the exercises this week, make sure to do this one.]
2. Hatcher 1.1.17
3. Use Van Kampen's Theorem to compute the fundamental group of the Klein bottle. Find a two-sheeted covering map from the torus to the Klein bottle, and compute the induced map of fundamental groups.
4. Consider the space X built from a seven-sided polygonal region by means of the labelling scheme $abaaab^{-1}a^{-1}$. Show that the fundamental group of X is the free product of two cyclic groups.
5. Hatcher 1.2.3
6. Hatcher 1.2.9
7. Hatcher 1.2.10
8. Hatcher 1.2.22 [Note: The explanation in this exercise may be a little dense; feel free to drop by office hours for some picture-drawing.]