

Math 525: Problem Set 5

Due date: In class on Wednesday, Oct 7.

Course Web Page: <http://dunfield.info/525>

Office hours: Mondays from 11-12, Tuesdays from 11:15 - 12:15, and by appointment. For an appointment, just talk to me after class, or email me at nmd@illinois.edu.

Required Text: Allen Hatcher, *Algebraic Topology*,
<http://www.math.cornell.edu/~hatcher/AT/ATpage.html>

1. Find all 2-sheeted covering spaces of $S^1 \vee S^1$, up to isomorphism without basepoints.
2. (Delayed until HW #6) Hatcher, Section 1.3, Problem 12.
3. Hatcher, Section 1.3, Problem 14.
4. Hatcher, Section 1.3, Problem 21.
5. Hatcher, Section 1.A, Problem 3.
6. Let F be a finitely generated free group of rank k . If $H \leq F$ has finite index $n = [F : H]$, prove that H is also finitely generated and compute its rank in terms of k and n .

