

Math 829: Algebraic Topology

Homework 3

Due Thursday, March 8th by midnight

1. Hatcher, Sec 1.1, Exercise 18
2. Show that the map $p_n : S^1 \rightarrow S^1$, $n \in \mathbb{Z} \setminus \{0\}$, given by $p_n(\theta) = n\theta$ is a covering map.
3. Hatcher, Sec 1.3, Exercise 2
4. Consider the torus, $T^2 = S^1 \times S^1$. Give three distinct (i.e. homotopy inequivalent) path-connected topological spaces which can serve as the domain of covering maps for T^2 .
5. Given a covering map $p : E \rightarrow B$ with E path-connected, we know that the cardinality of $p^{-1}(x)$ is invariant under choice of $x \in B$. We call this the *number of sheets* of the cover. Give three distinct 12-sheeted covering maps of the torus.
6. Hatcher, Sec 1.3, Exercise 3