

TOPOLOGY 2, HOMEWORK 3

- (1) Show that there is no non-empty, proper subspace \tilde{X} of \mathbb{R} such that the covering map $p: \mathbb{R} \rightarrow \mathbb{S}^1$ given by $p(t) = (\cos(2\pi t), \sin(2\pi t))$ restricts to a covering map $\tilde{X} \rightarrow \mathbb{S}^1$.
- (2) Hatcher, Section 1.1 #1
- (3) Hatcher, Section 1.1 #2
- (4) Hatcher, Section 1.1 #4
- (5) Hatcher, Section 1.1 #8
- (6) A *topological group* is a group G equipped with a topology such that the *inversion map* $G \rightarrow G$ given by $x \mapsto x^{-1}$ and *multiplication map* $G \times G \rightarrow G$ given by $(a, b) \mapsto ab$ are continuous. Show for any topological group G with identity element e that $\pi_1(G, e)$ is abelian.