

## Exercise sheet 2

1. Prove that the fundamental groups of homotopically equivalent spaces are isomorphic.
2. Prove that a map  $f : S^1 \rightarrow X$  is null homotopic if and only if it extends to a continuous map from the closed disc to  $X$ .
3. Prove that if  $f : S^1 \rightarrow S^1$  satisfies the property that  $f(-x) = -f(x)$ , then the induced map  $f_*$  is a non-trivial homomorphism. Here we are treating  $S^1$  as the subspace of unit complex numbers.

**to be updated**