

Homework 2

Algebraic Topology 2024-2025

Due 12 March, 2025

EXERCISE 1

Let X be a path connected topological space, and $A_1 \subseteq A_2 \subseteq A_3 \subseteq \dots$ path connected open subsets such that

$$X = \bigcup_{i=0}^{\infty} A_i.$$

Show that:

- If $\pi_1(A_i) = 0$ for all i , then $\pi_1(X) = 0$.
- If $\pi_1(A_i)$ is an abelian group for all i , then $\pi_1(X)$ is also an abelian group.