

Homework 10

Not Due

In this week's lectures we used the notation D^2 for the closed disc

$$D^2 = \{(x, y) \in \mathbb{R}^2 : x^2 + y^2 \leq 1\},$$

S^1 for its boundary circle

$$S^1 = \{(x, y) \in \mathbb{R}^2 : x^2 + y^2 = 1\},$$

and X/A for the quotient space obtained by collapsing a subspace $A \subset X$ to a point.

1. I claim that $(S^1 \times [0, 1]) / (S^1 \times \{0\})$ is homeomorphic to D^2 .
 - (a) Draw a picture.
 - (b) Argue that it is enough to write down a continuous surjection $S^1 \times [0, 1] \rightarrow D^2$ which is constant on $S^1 \times \{0\}$ and injective otherwise.
 - (c) Write down such a map.