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ÜBUNGEN ZUR VORLESUNG TOPOLOGIE II

Aufgabenblatt 11
Abgabe: Mittwoch, 8.7., in der Vorlesung

Exercise 11.1. Let $f : \mathbb{S}^n \to \mathbb{S}^n$ be a map of degree k. From the lecture, you know that $H^n(\mathbb{S}^n; A) \cong A$ for an arbitrary abelian group. What is the map $f^* : H^n(\mathbb{S}^n; A) \to H^n(\mathbb{S}^n; A)$?

Exercise 11.2. Let F_g be a closed orientable surface of genus g. Construct a CW structure on F_g and use this CW structure to compute the cohomology of F_g (with arbitrary coefficents).

Exercise 11.3. Compute the cohomology of $\mathbb{RP}^n$ using the CW structure given in the lecture with coefficients in $\mathbb{Z}/2$ and $\mathbb{Z}$ and compute the Bockstein sequence for the short exact coefficient sequence $0 \to \mathbb{Z} \xrightarrow{2} \mathbb{Z} \to \mathbb{Z}/2 \to 0$.

Exercise 11.4. Let $0 \to A \to B \to C \to 0$ be a short exact sequence of abelian groups. Show that the induced sequence $0 \to A \otimes \mathbb{Q} \to B \otimes \mathbb{Q} \to C \otimes \mathbb{Q} \to 0$ is also exact. Hint: to show the injectivity of $A \otimes \mathbb{Q} \to B \otimes \mathbb{Q}$, you have to use the classification theorem for finitely generated abelian groups.

Exercise 11.5. Let A be a finitely generated abelian group and let $M(A, 1)$ be the Moore space from exercise 9.2. Compute $H^*(M(B, 1); B)$ for an arbitrary abelian group B.