



LUDWIG-
MAXIMILIANS-
UNIVERSITÄT
MÜNCHEN

MATHEMATISCHES INSTITUT



Summer term 2018

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Topology II

Sheet 6

Exercise 1. Compute the homology of the following spaces with coefficients in \mathbb{Z}, \mathbb{Z}_2 :

$$S^n \times S^m, \underbrace{S^1 \times S^1 \times \dots \times S^1}_{n \text{ times}}, \mathbb{R}P^2 \times \mathbb{R}P^2, \mathbb{R}P^2 \times \mathbb{R}P^3.$$

Exercise 2. Show that if A and B are free then $A \otimes B$ is free.

Exercise 3. Let X, Y be finite CW-complexes and $b_i(X) = \dim_{\mathbb{Q}}(H_i(X, \mathbb{Q}))$. Prove that

$$b_n(X \times Y) = \sum_i b_i(X) \cdot b_{n-i}(Y).$$

Exercise 4. Show that

$$\chi(X \times Y) = \chi(X) \cdot \chi(Y)$$

for any two finite CW-complexes X, Y .

Hand in: during the lecture on Thursday, May 24th.