



LUDWIG-
MAXIMILIANS-
UNIVERSITÄT
MÜNCHEN

MATHEMATISCHES INSTITUT



Summer term 2017

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Topology II

Sheet 11

Exercise 1. Let $M = M_1 \times M_2$ be a closed connected oriented smooth manifold and $i : N \hookrightarrow M$ (resp. $j : L \hookrightarrow M$) be the embedding of $N = M_1 \times \{y\}$ (resp. $L = \{x\} \times M_2$) in M .

- (a) Determine the normal bundles of N and L in M .
- (b) Compute $i_*[N] \bullet j_*[L]$ up to sign.

Exercise 2. Use intersection theory to show that the fundamental class of $\mathbb{C}P^k \subset \mathbb{C}P^n$ generates $H_{2k}(\mathbb{C}P^n)$ for all $0 \leq k \leq n$.

Exercise 3. Discuss the intersection theory of $\mathbb{C}P^n \# \mathbb{C}P^n$.

Exercise 4. Let M, N be smooth closed connected oriented manifolds of dimension n and $n - 1$ respectively such that there exists an embedding $i : N \hookrightarrow M$. Prove that if $i_*[N] \neq 0 \in H_{n-1}(M; \mathbb{Z})$ then $i_*[N]$ is primitive, i.e. $i_*[N] \neq ka$ for any $k > 1$ and any $a \in H_{n-1}(M; \mathbb{Z})$.

The sheet will be discussed on Tuesday, July 25th, during the exercise class.