LMU LUDWIG-MAXIMILIANS-UNIVERSITÄT MÜNCHEN
MATHEMATISCHES INSTITUT

Summer term 2019

Prof. D. Kotschick
G. Placini

Topology II

Sheet 10

Exercise 1. Prove that the map $T_X \colon \Omega_n(X) \longrightarrow H_n(X)$ is a well-defined homomorphism.

Exercise 2. Let M_g be the closed orientable surface of genus g. Show that if a map $f : M_g \to M_h$ of nonzero degree exists then $g \geq h$. Conversely show that if $g \geq h$ then there exists a map $f : M_g \to M_h$ of degree 1.

Exercise 3. Given two compact connected oriented manifolds M and N of dimension $4n$, show that if $M \geq N$ then $b_{2n}(M) - |\sigma(M)| \geq b_{2n}(N) - |\sigma(N)|$.

Exercise 4. Let M be a compact orientable $4k$-dimensional manifold with $\partial M \neq \emptyset$. Prove that $\sigma(D(M)) = 0$ where $D(M) = M \bigcup_{\partial M} \overline{M}$ is the double of M.

Hand in: during the exercise class on Monday, July 15th.