

Topics in Topology
(Homework 5)
February 9, 2015

- Due date - February 18, 2015.
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1. Prove that a closed manifold of odd dimension has Euler characteristic zero. [5 points]
2. Let M be a closed connected, non-orientable 3-manifold and let $H_1(M, \mathbb{Z}) = \mathbb{Z}^r \oplus A$ where A is a finite abelian group. Prove that $r \geq 1$ and also compute the torsion in $H_2(M, \mathbb{Z})$. [10 points]
3. Show that if a closed orientable manifold M of dimension $2k$ has $H_{k-1}(M; \mathbb{Z})$ torsion-free, then $H_k(M, \mathbb{Z})$ is also torsion-free. [5 points]