

Topological methods in combinatorics

Class work – Homology

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1. Consider a graph G as a simplicial complex. Interpret the meaning of 0,1-cycles and boundaries.
2. Compute the homology groups of Δ_d from definition.
3. Compute the homology groups of Δ_d using homotopy invariance.
4. We have for $d \geq 1$ that

$$H_n(S^d) \cong \begin{cases} \mathbb{Z} & \text{if } n = 0, d, \\ 0 & \text{otherwise.} \end{cases}$$

Prove that there is no retraction from B^d to S^{d-1} . (Do you see that this implies Brouwer's theorem?)