

The aim of this work was to present different approaches to the proof of Brouwer fixed point theorem and to avoid proofs based on homotopy theory, degree of mapping or any non-trivial algebraic topology. The proofs were chosen so that only a basic knowledge of combinatorics and mathematical analysis is required to understand them and the reader could learn about other fundamental topological theorems.

At first, we prove by a combinatorial procedure Borsuk-Ulam theorem from which Brouwer theorem simply follows. We then use the basics of mathematical analysis to prove a theorem known as The hairy ball problem, which also directly implies Brouwer theorem. Finally, we will show an unconventional application of Brouwer theorem to prove the fundamental theorem of algebra.