Combinatorial fixed point theorems

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Abstract

The Brouwer fixed point theorem and the Borsuk-Ulam theorem are beautiful and well-known theorems of topology. It is perhaps less well-known that the Borsuk-Ulam theorem implies the Brouwer fixed point theorem, and that these theorems both admit combinatorial analogues. In particular, Sperner's lemma is equivalent to the Brouwer fixed point theorem, and Tucker's lemma is equivalent of the Borsuk-Ulam theorem. With these theorems, I will trace recent connections, applications, and generalizations— some of which includes research with undergraduates.