Antimagic labelings of regular bipartite graphs: 
An application of the Marriage Theorem

Daniel Cranston, DIMACS, Rutgers University

Abstract

A labeling of a graph is a bijective function onto its edges from the set \(\{1, 2, \ldots, |E(G)|\}\). A labeling is antimagic if for every pair of distinct vertices \(u\) and \(v\), the sum of the labels on edges incident to \(u\) is different from the sum of the labels on edges incident to \(v\). We say a graph is antimagic if it has an antimagic labeling. In 1990, Ringel conjectured that every connected graph other than \(K_2\) is antimagic. The most significant progress has been made by Alon et al. (in 2004), who showed there exists a constant \(C\), such that if an \(n\)-vertex graph \(G\) has \(\delta(G) \geq Cn\), then \(G\) is antimagic. In this paper, we show that every regular bipartite graph (with degree at least 2) is antimagic. Our technique relies heavily on the Marriage Theorem.