Combinatorics Seminar

Wednesday, October 18th, 2023

4:00-5:00 pm in Hume 321

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The Independent Bondage Number of Planar Graphs with Degree Conditions and Girth Conditions

Abstract

For a finite graph G, a vertex set D of G is said to be a dominating set of G, if every vertex $v \in V(G) - D$ has a neighbor in D. Further, if D is an independent set of vertices (D is an independent set if there is no edge between any two vertices of D) as well, we say D is an independent dominating set. Define $\gamma^i(G)$ to be the minimum cardinality among all independent dominating sets of G. The bondage number of G denoted by $b(G)$, is defined as $\min\{|B| : B \subset E(G)$ such that $\gamma(G - B) > \gamma(G)\}$. Similarly, the independent bondage number of G denoted by $b_i(G)$ and is defined as $\min\{|B| : B \subset E(G)$ such that $\gamma^i(G - B) > \gamma^i(G)\}$.

In 2022, Pham and Wei proved that $b_i(G) \leq 9$ for planar graphs with minimum degree 3. We improve this upper bound by showing that $b_i(G) \leq 8$. In 2003, Fischermann et al. established upper bounds of bondage numbers for connected planar graphs based on girth (the length of a shortest cycle in the graph) conditions. However, to date, no upper bounds have been developed for the independent bondage number concerning connected planar graphs using girth conditions. In this talk, we also present upper bounds on independent bondage numbers for connected planar graphs utilizing girth conditions.