Dissertation Defense

On Saturation Spectrum

Jessica Fuller
Emory

Abstract: Given a graph H, we say a graph G is H-saturated if G does not contain H as a subgraph and the addition of any edge not already in G results in H as a subgraph. The question of the minimum number of edges of an H saturated graph on n vertices, known as the saturation number, and the question of the maximum number of edges possible of an H -saturated graph, known as the Turn number, has been addressed for many different types of graphs. We are interested in the existence of H -saturated graphs for each edge count between the saturation number and the Turn number.

We determine the saturation spectrum of (Kt-e)-saturated graphs and Ft-saturated graphs. Let (Kt-e) be the complete graph minus one edge. We prove that (Kt-e)-saturated graphs do not exist for small edge counts and construct (Kt-e)-saturated graphs with edge counts in a continuous interval. We then extend the constructed (Kt-e)-saturated graphs to create (Kt-e)-saturated graphs. Let Ft be the graph consisting of t edge-disjoint triangles that intersect at a single vertex v. We prove that F2-saturated graphs do not exist for small edge counts and construct a collection of F2-saturated graphs with edge counts in a continuous interval. We also establish more general constructions that yield a collection of Ft-saturated graphs with edge counts in a continuous interval.

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Advisor: Ron Gould

Mathematics and Computer Science
Emory University