VCU Discrete Mathematics Seminar

Subgraph Complementation and Minimum Rank

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Wednesday, Oct. 12
1:00-1:50 EST

Watch party in 4145 Harris Hall
& Zoom @ `https://vcu.zoom.us/j/92975799914`
`password=graphs2357`

It is possible to obtain any n-vertex simple graph G from any other n-vertex graph H by performing a sequence of subgraph complementations, meaning that we can iteratively replace induced subgraphs by their complements until we obtain G from H. We ask for the minimum number of subgraph complementations required to obtain G from H. When H is the graph with no edges, we denote this parameter by $c_2(G)$. Finding $c_2(G)$ relates closely to the minimum rank problem.

We show that $c_2(G) = \mathrm{mr}(G, \mathbb{F}_2)$ when $\mathrm{mr}(G, \mathbb{F}_2)$ is odd or when G is a forest; otherwise, $\mathrm{mr}(G, \mathbb{F}_2) \leqslant c_2(G) \leqslant \mathrm{mr}(G, \mathbb{F}_2) + 1$. We then provide two conditions which are equivalent to having $c_2(G) = \mathrm{mr}(G, \mathbb{F}_2) + 1$. In this case, we can still interpret $\mathrm{mr}(G, \mathbb{F}_2)$ combinatorially using a variation of subgraph complementation. Finally, the class of graphs G with $c_2(G) \leqslant k$ is hereditary and finitely defined for any natural number k. We exhibit the sets of minimal forbidden induced subgraphs for small values of k.

This is joint work with Christopher Purcell and Puck Rombach.

For the DM seminar schedule, see:

`https://vcumath.github.io/Seminar/dms.html`