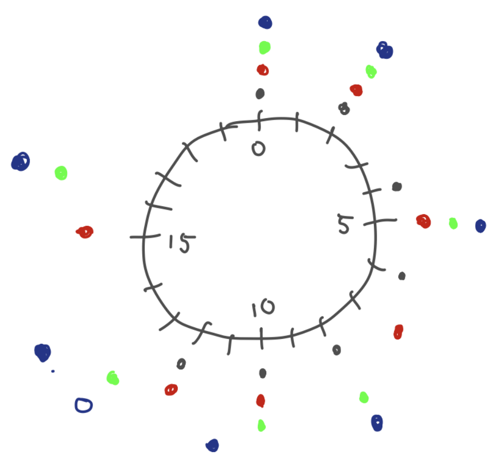
VCU Discrete Mathematics Seminar

Metric general position generalizations of classical graph invariants

Prof Brent Cody
(VCU!)

Wednesday, April 8
1:00-1:50 EST

In Person in 4145 Harris, with Zoom option:
`https://vcu.zoom.us/j/81475528886`
`password=graphs2357`



We introduce a two-parameter framework that refines classical graph invariants by imposing constraints along bounded-length geodesics. For integers $d \geqslant k-1 \geqslant 1$, a vertex coloring is k, d-proper if every shortest path of length at most d contains fewer than k vertices of any one color. Dually, a set of vertices S is a k, d-clique if every k-subset of S lies on a shortest path of length at most d. Let $\chi_d^k(G)$ and $\omega_d^k(G)$ denote the corresponding chromatic and clique numbers. The classical clique lower bound easily generalizes to $\omega_d^k(G) \leqslant (k-1)\chi_d^k(G)$ and a graph G is called k, d-perfect when equality holds. While the classical case $(k, d) = (2, 1)$ is recovered, the regime $k > 2$ behaves quite differently. Although a cycle C_n is classically perfect if and only if n is even, we show that every odd cycle is $3, 2$-perfect, and that C_n is $3, 6$-perfect if and only if $n \neq 17$, in contrast to the classical case. We obtain a complete characterization of k, d-perfect cycles, using techniques originating in Clough and Douthett's work in music theory.

For the DM seminar schedule, see:

`https://go.vcu.edu/discrete`