VCU Discrete Mathematics Seminar

On the existence of (r, g, χ) *-graphs*

Prof Linda Lesniak (Western Michigan University)

Wednesday, Mar. 13 1:00-1:50 EST

In person in 4145 Harris Hall, and on Zoom @ https://vcu.zoom.us/j/92975799914 password=graphs2357



In 1961, Erdős showed the following: Given integers $\chi \ge 3$ and $g \ge 3$, there exists a graph with chromatic number χ and girth g. In 1947, Tutte asked the following question : Given integers $r \ge 2$ and $g \ge 3$, does there exist an r-regular graph with girth g? Erdős and Sachs established existence for all pairs r, g in 1960. Finally, Rubio-Montiel considered the problem of the existence of graphs with a given regularity r and chromatic number χ .

In this talk we'll look at the question of the existence of (r, g, χ) -graphs, that is, r-regular graphs of girth g with chromatic number χ . These graphs were introduced by Gabriela Araujo-Pardo, Zhanar Berikkyzy and Linda Lesniak, where the emphasis was on the case $\chi = 3$. But we now know, for example, according to work of Gabriela Araujo-Pardo, Julio Diaz-Calderon, Julian Fresan, Diego Gonzales-Moreno, L*2 and Mika Olsen, that if g and χ are integers both at least 3, then for r sufficiently large there exist (r, g, χ) -graphs.

Finally, we'll consider the question of the existence of "equitable" (r, g, χ) -graphs, that is, (r, g, χ) -graphs with a χ -coloring in which the color classes differ in size by at most 1.

For the DM seminar schedule, see: https://go.vcu.edu/discrete