UNIVERSITY OF PUERTO RICO
RIO PIEDRAS CAMPUS
FACULTY OF NATURAL SCIENCES
DEPARTMENT OF MATHEMATICS

Speaker:
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Title:
The maximum nullity of a complete subdivision graph is equal to its zero forcing number

Abstract:

A graph $G = (V, E)$ is a set of vertices $V = \{1, ..., n\}$ and set of edges E of two element sets of vertices. A graph describes the family of $n \times n$ real symmetric matrices $A = [a_{ij}]$ by using the edges of the graph to describe the position of nonzero off-diagonal entries of A, with the edge $\{i, j\}$ associated with the entry a_{ij} being nonzero.

The maximum nullity problem for graphs asks us to determine for any graph G the maximum nullity among the matrices described by G. Despite recent progress, the problem remains open, and there are specific graphs of not very large order for which there is no known method to find the maximum over the infinite family of matrices described by the graph.

The zero forcing number is a graph coloring game parameter that is an upper bound for maximum nullity. Although in general zero forcing number is NP-hard to compute, it is still a finite computation, and if it is known that maximum nullity equals zero forcing number for a particular small graph, even brute force computation of zero forcing number allows the computation of maximum nullity; for some graphs there are better methods to find the zero forcing number.

An edge $e = \{u, v\}$ of $G = (V, E)$ is *subdivided* by inserting a new vertex w into V, deleting the edge e and inserting edges $\{u, w\}$ and $\{w, v\}$. The *complete subdivision graph* of a graph G is obtained from G by subdividing each edge of G once. In 2009 it was asked whether the maximum nullity is equal to the zero forcing number for all complete subdivision graphs.

This talk will provide an introduction to maximum nullity and zero forcing number, describe the ideas used in the proof that equality holds for complete subdivision graphs, and show how to determine this common value.

Wednesday, March 19, 2014
10:30-11:30 am
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