Department of Mathematical Sciences
The University of Texas at El Paso

Colloquium

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Friday, September 20, 2013 at 3 pm in Bell Hall 143

Graph Coloring and Repeated Addition in Rings

The goal of this talk is to show that repeated addition in rings (adding an element to itself multiple times) and graph coloring are related concepts. We discuss how combinatorial objects, such as permutations, set partitions, or graphs on finite vertex sets, can be combined and decomposed, giving rise to a new algebraic structure, called a combinatorial ring (short for 'ring object in the category of combinatorial species'). In this context, repeated addition is replaced with 'convolution powers', which give rise to a polynomial invariant of a combinatorial object; the characteristic polynomial. Moreover, properties of convolution powers imply identities for characteristic polynomials. We focus on studying graphs, where the characteristic polynomial is related to graph coloring.