Graph Polynomials - Part I

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Independence Equivalence Class of Paths and Cycles

The independence polynomial of G, denoted by $i(G,x)$ is defined by $i(G,x) = \sum_{k=0}^{\alpha} i_k x^k$ where i_k is the number of independent sets of size k in G and α is the independence number. Two graphs G and H are considered independence equivalent if $i(G,x) = i(H,x)$. The independence equivalence class of G is the set of all graphs independence equivalent to G. In this talk we will discuss the independence equivalence class of P_n and C_n. This is joint work with Jason Brown and Ben Cameron.

BEN CAMERON, Dalhousie University

The Maximum Modulus of an Independence Root

The *independence polynomial* of a graph is the generating polynomial for the number of independent sets of each size. Its roots are called *independence roots*. In this talk we will bound $\mathrm{maxmod}(n)$, the maximum modulus of an independence root over all graphs on n vertices, and $\mathrm{maxmod}_T(n)$, the maximum modulus of an independence root over all trees on n vertices. We will show that both values are exponential in n. More precisely, we show

$$\frac{\log_3(\mathrm{maxmod}(n))}{n} = \frac{1}{3} + o(1) \qquad \text{and} \qquad \frac{\log_2(\mathrm{maxmod}_T(n))}{n} = \frac{1}{2} + o(1).$$

This is a joint work with Jason Brown.

LUCAS MOL, University of Winnipeg

The Subtree Polynomial

The subtree polynomial of a tree T is the generating polynomial for the number of subtrees of T. The subtree polynomial encodes a variety of interesting parameters of the tree including the total number of subtrees, the mean subtree order, and the independence number. We present a sharp constant bound on the roots of the subtree polynomial of a tree. We then discuss root-free and root-dense intervals of the real line. Finally, we give a short proof of the fact that the path (star, respectively) has coefficient-wise least (greatest, respectively) subtree polynomial. This is joint work with Jason Brown.

LISE TURNER, University of Waterloo

Convergence of Coefficients of the Rank Polynomial in Benjamini-Schramm Convergent Sequences of Graphs

Benjamini-Schramm convergence is a notion of convergence that is based on local behaviour and useful for sparse graphs. We show that it implies a convergence result on the coefficients of the rank polynomial. This is joint work with Dmitry Jakobson, Calum MacRury and Sergey Norin.

MACKENZIE WHEELER, University of Victorica

Chromatic Uniqueness of Mixed Graphs

For simple graphs G and H with chromatic polynomials $P(G,\lambda)$ and $P(H,\lambda)$, G and H are said to be *chromatically equivalent* if $P(G,\lambda) = P(H,\lambda)$ for all values of λ. If the only graphs which are chromatically equivalent to G are also isomorphic to G, then G is said to be *chromatically unique*. In this talk we will consider the problem of chromatic uniqueness for mixed graphs and directed graphs. In particular we will present several classes of directed graphs which are chromatically unique, as well as classify mixed graphs which are chromatically equivalent to their underlying graph.