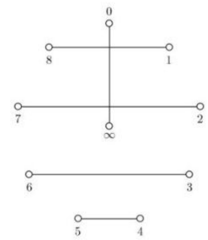
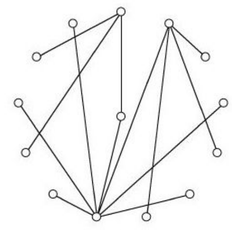
2013 Kieval Lecture Series

Dr. John Caughman

THE FUN OF RAINBOW SPANNING TREES

Two Ways to Decompose a Complete Graph





Graph theorists say an edge coloring is "proper" if any two edges that meet at a vertex are assigned different colors. So any proper edge coloring of the complete graph *K(2n)* on *2n* vertices requires at least *2n-1* colors. Seemingly unrelated, a "spanning tree" for *K(2n)* is just a connected, acyclic subgraph with *2n-1* edges. What could these two notions have in common? Relative to a given proper edge coloring, a "rainbow spanning tree" is a spanning tree whose *2n-1* edges have *2n-1* distinct colors. The BH-conjecture, open since 1996, states that for any proper coloring of *K(2n)* with *2n-1* colors, there exist *n* disjoint rainbow spanning trees whose union is all of *K(2n)*. We explore this conjecture and prove a few special cases.

Thursday, May 30th, 4:00 PM, Stevenson Union 319

HOW LOW CAN YOU GO?

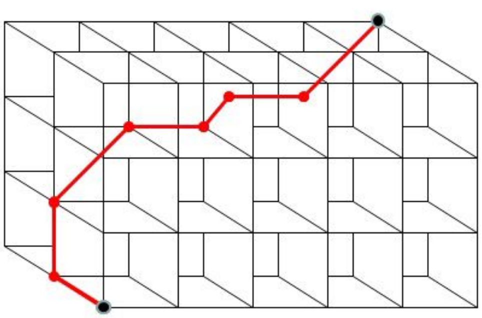
Setting the Bar Low for Rectangle Visibility Graphs

Given a finite set of rectangles in the plane, we say two rectangles are visible to each other if there is an unobstructed vertical or horizontal line of sight between their boundaries. The associated graph, whose vertices are the rectangles, and where adjacency corresponds to visibility, is called a Rectangle Visibility Graph (RVG). In this talk, we survey some recent results on RVGs and discuss a new algorithm for finding minimum height RVG representations of trees.

Friday, May 31st, 10:30 AM, Churchill 231

HOW MANY WAYS THROUGH THE MAZE?

Counting Lattice Chains and Delannoy Numbers



Lattice chains and Delannoy paths represent two different ways to progress through a lattice. In 1997, when computational techniques suggested a coincidental relation between these two notions, a mystery was born. The challenge was issued to extend the result and verify the phenomenon. Eschewing the computational approach, my colleagues and I were able to use elementary counting techniques to derive new expressions for the number of chains and the number of Delannoy paths in a lattice of arbitrary finite dimension. These expressions resolved the mystery and offered a new proof of this curious result.

Friday, May 31st, 4:00 PM, Science 118