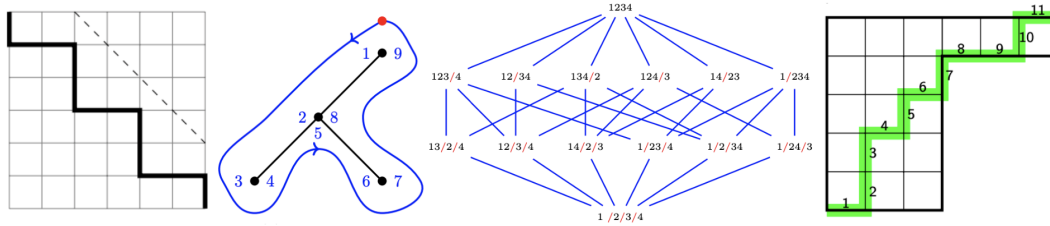


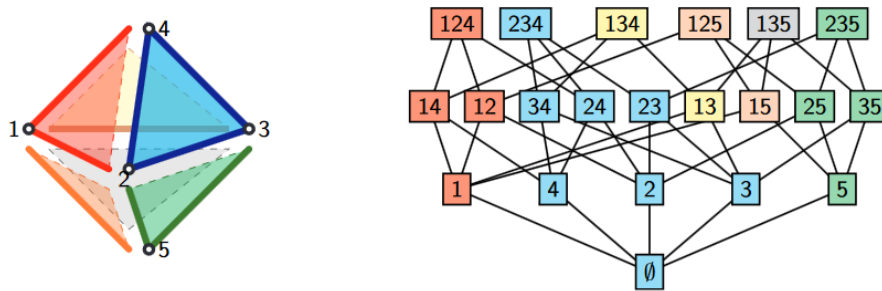
MATH 3094 - Fall 2024

Algebraic Combinatorics

Algebraic combinatorics is an area of mathematics where combinatorial techniques are applied to algebraic problems (or vice versa). Common objects of study (some of which are pictured below) include lattice paths, matroids, partially ordered sets, tableaux, graphs, and symmetric functions. If you don't know what these are, then you will learn in the course!



Below is an example of two objects that are related: the simplicial bipyramid and a poset. The bipyramid can be thought of (algebraically) as a subset of 6 intersecting planes in 3-space. Instead of looking at a system of 6 plane equations in 3 variables, we can encode the combinatorial data of their intersections into a poset (the object on the right). Can you figure out how the poset is built from the vertices, edges, and faces of the bipyramid? What do the edges and “levels” in the poset correspond to in the bipyramid? Can you build the analogous poset for a cube? An icosahedron?



This course will provide a broad overview of the history and current research going on in the field of algebraic combinatorics. If you are not interested in the example I gave above, then you shouldn't be worried. Algebraic combinatorics is a vast and ever-growing field; there is something for everyone. Topics will include: partially ordered sets (posets) and lattices, matroids, representations of the symmetric group, symmetric functions, and (time permitting) some open problems in algebraic combinatorics.

Prerequisites: Linear Algebra (MATH 2210). Transition to Advanced Math (MATH 2710) or permission of the instructor is also required.

Enrollment: Contact the instructor for a permission number.

Questions? Contact the instructor, Blake Jackson, at blake.jackson@uconn.edu.