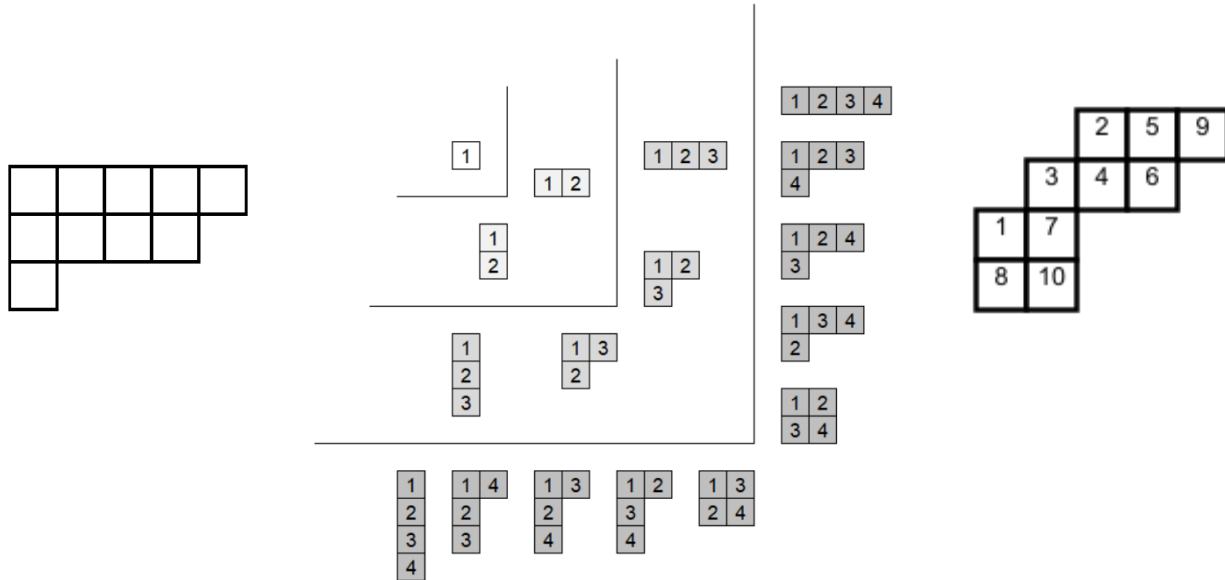


Young Tableaux  
Grad Student: Stephanie Gaston

Seminar Description:

This seminar will explore the combinatorics of tableaux. Some examples of the objects we will be studying are below.



These combinatorial objects have numerous applications in combinatorics, representation theory, and algebraic geometry including in the study of symmetric functions and their bases and the representation theory of the  $S_n$ . To keep the seminar reachable, we will not be spending much time on these applications. We will focus on the objects themselves.

*No prerequisites.*

Goals:

Our goal in how we approach this content will be focused on students collaborating and developing questions to ask. Definitions will be introduced in short lectures and the majority of the time will be about students exploring the definitions, seeing what questions they can ask about the content, and attempting to answer them in weekly exercises. The idea is figuring out how to get comfortable with mathematical concepts without a book leading you. There is no required text.

No background knowledge is required. However, if there is interest, we can add an additional half hour to each meeting to discuss proofs for those who have taken MAT 108.

Meeting Agenda: (1 hour – 1.5 hour)

Each meeting will follow this basic set up

- (~30 min) Review exercises from last week
  - Primarily student led, this will be a mixture of pair and group work.
- (~20 min) Lecture
  - Introducing concepts/definitions
  - Prompting for what questions can we ask about these concepts
- Next exercise set passed out and add new questions to explore if applicable
- (~30 min) Proof discussion
  - This will only occur for those interested, if there is interest.

Tentative Plan for Content Coverage:

- Meeting 1:
  - Introduction and Overview
  - Partition basics, Young diagram, tableau
- Meeting 2: Partial orderings, orderings of partitions, posets
- Meeting 3: Operations on Tableau, row insertion, rectification
- Meeting 4: Kostka numbers
- Meeting 5: Littlewood Richardson numbers
- Meeting 6: RSK
- Meeting 7: RSK continued
- Meeting 8: Schur polynomials
- Meeting 9: overall summary and applications

\*\*Content coverage will highly depend on how quickly we go through material. The goal is to understand deeply rather than to cover all the content listed. Topics may also change weeks based on where student questions lead.