MATH 636, Fall 2015
Homework 13
To be prepared for presentation on Tuesday, November 17.

Background reading: Combinatorics: A Guided Tour, Section 4.1 plus additional material.

Only consult with your classmates or professor to discuss the problem set.

We will discuss solutions to these questions in class.

13-1. Use a bijection to show that sequences $1 \leq a_1 \leq a_2 \leq \cdots \leq a_n$ of length n, where each $a_i \leq i$ are also counted by the Catalan number C_n. For example, when $n = 3$, the five sequences are 111, 112, 113, 122, and 123.

[*Hint: Look at the boxes to the left of a Dyck path.*]

13-2. (a) Calculate $\mathsf{des}(\pi)$, $\mathsf{inv}(\pi)$, and $\mathsf{maj}(\pi)$ for $\pi = 963852741$.

(b) Let π be an n-permutation with reverse $\widehat{\pi}$. How is $\mathsf{inv}(\pi)$ related to $\mathsf{inv}(\widehat{\pi})$