Organizational Notes

1. A Zoom recording link and class notes will be sent out after each class.

2. Remember to send your answers to the classroom worksheets. Title your email with enough to help me record your “participation”.

3. Homework #5 is due today (Thursday, Nov. 5).

Review

1. What is a Dyck path?

2. What is the number of Dyck paths with $2n$ steps?

Combinatorial Interpretation of the Explicit Catalan Number Formula (Sec. 1.6)

1. What does the formula $C_n = \frac{1}{n+1} \binom{2n}{n}$ count?

2. What is a cyclic shift of the sequence $a_1a_2\ldots a_k$?

3. How many cyclic shifts are there of a $k$ term sequence?

4. How many different sequences of two 1’s and one -1 are there?

5. List each sequence of two 1’s and one -1 and for each all cyclic shifts.

6. How many different sequences of three 1’s and two -1’s are there?

7. List each sequence of three 1’s and two -1’s and for each all cyclic shifts.

8. What is a strict ballot sequence with $n+1$ 1’s and $n$ -1’s?
9. **Claim:** For any sequence of $n+1$ 1’s and $n$ -1’s there is a cyclic shift of the sequence that is a strict ballot sequence.  
   Check this claim with our examples.

10. **Claim:** For any sequence of $n+1$ 1’s and $n$ -1’s there is a cyclic shift of the sequence that is a strict ballot sequence.  
    How can we prove this?