Last name _____

First name _____

LARSON—MATH 350—CLASSROOM WORKSHEET 18
Ballot Sequences & Bracketings

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".

Review

1. Can you conjecture the number of ballot sequences with length $2n$????

2. How can you *prove* this conjecture?

Counting Ballot Sequences (Sec. 1.5)

1. Another way to count the number of ballot sequences with length $2n$ is to show that they satisfy the same recursive formula as the Catalan numbers, with the same initial terms ("initial conditions").

   Parenthesization/Bracketing

2. What is a *bracketing* of a string of $n+1$ x's?

3. Find all bracketings of strings of 1 x's ($n = 0$ left parentheses, and $n = 0$ right parentheses).

4. Find all bracketings of strings of 2 x's ($n = 1$ left parentheses, and $n = 1$ right parentheses).

5. Find all bracketings of strings of 3 x's ($n = 2$ left parentheses, and $n = 2$ right parentheses).

6. Find all bracketings of strings of 4 x's ($n = 3$ left parentheses, and $n = 3$ right parentheses).

7. Find all bracketings of strings of 5 x's ($n = 4$ left parentheses, and $n = 4$ right parentheses).

8. Can you conjecture the number of bracketings of strings with $n + 1$ x's?

9. How can you *prove* this conjecture?