

**MATH 113: DISCRETE STRUCTURES
INSTRUCTIONS FOR EXAM 3**

- » Our third exam covers **Catalan structures** (pages 101–109 of the course text) and **discrete probability theory** (pages 127–143).
- » This is a **50-minute** exam that will take place in class on **Friday, April 17**.
- » During the exam, you are permitted to reference one double-sided letter-sized (8.5" × 11") sheet of notes.
- » Calculators, computers, phones, collaboration, books, the Internet, and AI are **prohibited** during the exam.
- » If questions arise during your studying, please feel free to email me or message me on Zulip.

Suggestions for studying for the exam:

- (1) Review the text (pages 101–109 and 127–143), paying particular attention to all definitions, examples, propositions, and theorems. Note that the text has exercises you should attempt.
- (2) Rewatch the relevant lectures.
- (3) Review the group problems and homework assignments covering Catalan structures and probability. There are links to solutions on the course website.
- (4) Practice writing out the key proofs in your own words. Especially important are:
 - » Theorem 134 (Dyck paths are counted by C_n , via the exceedance bijection);
 - » Proposition 138 (the Catalan recurrence, via balanced parenthesizations);
 - » Proposition 142 (full binary trees are counted by C_n);
 - » Theorem 182 (linearity of expectation);
 - » Theorem 183 (expected fixed points of a permutation);
 - » Theorem 175 (Law of Total Probability).
- (5) Make sure you can fluidly translate between the Catalan structures covered in the text: Dyck paths, balanced parenthesizations, full binary trees, and complete parenthesizations of factors.
- (6) Take time to decide what to include in your sheet of notes.
- (7) Work through the practice exam below and check your solutions.
- (8) Relax, and try to enjoy the review process. This is beautiful material!