Math 188, Fall 2022
Study guide for Midterm 2

- The exam is in-class on November 8.
- There are no notes or books allowed.
- I will provide paper, so do not bring a blue book.
- Content: everything in weeks 3–5. In my notes, this is §2.5–§3.8. I will not ask specifically about content prior to week 3, but you'll still need it as prerequisite information.

The format will be similar to Midterm 1. Here is what I expect you to know for the exam.

- All homework problems from Homeworks 3 and 4 (ignore optional problems) whether they were graded or not. You might see them in the exact same form, either partially or in whole. You might also see them with slight modifications.
- Computations
  (1) General ideas from Catalan numbers (finding "quadratic" recurrence relations and its meaning for generating function)
  (2) Turning relations on sequences into relations on generating functions
  (3) Interpreting coefficients of products of generating functions (e.g., the idea in the proof of Theorem 3.2)
  (4) Using words to solve subset problems (like Example 3.10)
  (5) Generating functions for various functions related to counting integer partitions
- Statements of theorems: you may be asked to state a formula or to complete or fully give the statement of a theorem. You don't need to memorize them word for word how I wrote them, but you should be able to give a statement that is logically equivalent.
  (1) Formula for Catalan numbers
  (2) All entries from 12-fold way together with the theorems attached to those formulas
  (3) Stirling number recurrences (both kinds)
  (4) Formulas in §3.8: number of vectors, number of linearly independent tuples, number of subspaces
- Definitions: I might ask you to state a definition, generally you'll know these if you study the rest, but just to be thorough:
  (1) Any definitions related to 12-fold way: (injective) words, set/integer partitions, (weak) compositions
  (2) Young diagram, transpose, Durfee square
- Derivations and proofs: it will help to internalize the main ideas from the derivations and proofs that we discuss in class. I don't plan to ask you to repeat them (unless it falls under one of the first 3 categories), but they will help you with all of the above.