Math 184, Spring 2023, Midterm 2 study guide

Details are the same as Midterm 1. Reminders:
- It will take place during lecture, Center 216, on **Tuesday**, May 16.
- This is a closed-book, closed-note exam. Just bring something to write with.
- Bring your ID.
- We will end at 10:45 (5 minutes early) to allow time for collecting exams.

1. CONTENT

Midterm 2 covers the contents of Homeworks 3 and 4. In the course notes, this is Sections 3.2 through 6.1. In terms of lectures this is April 18–May 2, together with the beginning of May 4 (the part on inhomogeneous linear recurrence relations). I will not explicitly put problems related to what was in Midterm 1, but I can't completely separate it either since the material builds on itself.

The actual topics:
- Set partitions: Stirling numbers, relation to falling factorials, methods for directly counting, recursive formula and related bijections
- Integer partitions: definitions, some basic bijections
- Binomial and multinomial theorems: statement, how to simplify sums
- Formal power series: algebra of FPS (addition, multiplication, derivatives, composition), extracting coefficients of terms, general binomial theorem
- Ordinary generating functions: finding simple expressions for generating function given a sequence (either as an explicit formula or as recurrence)
- Linear recurrence relations: using characteristic polynomial to find closed formula, solving some basic inhomogeneous recurrence relations

You can review the podcasted lectures through the "media gallery" in Canvas. Unfortunately, the audio was recorded at a very low volume for Lecture 6. It is possible to hear the dialogue, but an alternative is to look at the relevant portions of the Jan18 and Jan20 videos posted under Winter 2022.

2. PRACTICE PROBLEMS

The schedule of topics from Fall 2019 does not line up well with what we're doing now, so that Midterm 2 is not useful for study. Instead, I've pulled the relevant problems together with some problems from Winter 2022 exams and posted them on the course site:

https://mathweb.ucsd.edu/~ssam/184/practice-mt2.pdf

This is longer than what you should expect, so keep that in mind if you're worried about speed.

3. EXTRA PRACTICE FROM BÓNA

If you want additional practice with the material, I have highlighted relevant exercises from the **4th edition** of the textbook.

All of these have solutions in the book:
- Chapter 4: 3-4, 18-19, 26-28
- Chapter 5: 6-7, 11
- Chapter 8: 1-2, 4-5

The following do not have solutions in the book. I will not provide a solutions manual due to time constraints. However, I am happy to discuss these problems either in office hours or over Discord.

- Chapter 4: 41, 43-47, 50
- Chapter 5: 20, 22
- Chapter 8: 25-28, 38-40

If you're using the **3rd edition**, the numbering is a little different and some problems are missing, but there's still a lot here:

- Chapter 4: 3-4, 17-18, 25-27, 40, 42-46, 49
- Chapter 5: 6-7, 11, 19, 21
- Chapter 8: 1, 3-4, 23-25, 34-36