Math 184, Fall 2023, Midterm 1 study guide

At the end you will find the cover page for the midterm. Please read the instructions ahead of time so that there aren't any surprises. Particularly important:

- It will take place during lecture, in Pepper Canyon 122, on October 25.
- This is a **closed-book, closed-note exam**. Just bring something to write with.
- Bring your ID.

1. Content

Midterm 1 covers the contents of Lectures 1–6, which is up to and including Section 3.1 in the course notes:

- Induction is *not specifically* on the exam. This was meant to be review.
- Methods to deal with bijections (sum principle, subtraction principle, product principle, and actually finding bijections)
- Permutations (and variations)
- Words and the problems they apply to
- Choice problems: subsets, multisets, Poker hands
- (Weak) compositions and the problems they apply to
- Set partitions

Understanding how to do all of the problems (by yourself, without referencing notes) in Homeworks 1 and 2 is the best way to prepare. All of the problems will be related to something in the homework.

Homework solutions are posted in Canvas, under "files".

I prefer to emphasize methods and techniques rather than formulas. Of course, remembering formulas is important, but you should think of it as secondary to understanding *how* to solve the homework problems.

You can review the podcasted lectures through the "media gallery" in Canvas.

2. Study advice

Here are some miscellaneous tips:

- Start early. Generally speaking, spreading out your studying across many days is much more effective than cramming the night before.
- When studying problems, it is best to try to do them without looking at any notes and only look at them when you get stuck. This is the best way to develop intuition.
- Form study groups. I've created a `midterm1` channel on the Discord server to discuss studying and practice problems.
- Try to think up your own problems and exchange with friends.
- The discussion session on October 24 will be reserved for midterm review, but to be most effective, you should bring questions.
- Take advantage of office hours to clear up any confusions, no matter how minor.

3. Spring 2023 practice exam

I've posted Midterm 1 from Spring 2023 on the course site. Some differences:

- You can ignore problem 1 on falling factorials. That is not part of Midterm 1 this time.

- That was a 75 minute exam. You will have only 50 minutes, and so the exam will be shorter. An appropriate conversion would be to take just these problems: 2, 3, 4a, 5b, 6.

I recommend working through this old exam only after you have made a serious effort to study the material. You only get one chance to use it to test your level of preparation.

4. 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 (problems are essentially the same in the third edition).

- Chapter 3: 1-3, 6-12, 14-15, 18-20, 23
- Chapter 5: 17

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 3: 27-37, 41-42, 44-47, 49-50, 52-55
- Chapter 5: 18-21, 23-26, 36-37

Math 184, Midterm 1
Instructor: Steven Sam
October 25, 2023
2PM – 2:50PM

Your name:

(Try to use the exact name that is in Gradescope, since it will be automatically matched.)

Student ID:

- **No books, materials, notes, cell phones, calculators, etc.** Consulting other students or any other sources is considered an **academic integrity violation** and will be treated as such.

- Pages will be separated for scanning. **Write your name at the top of each page.** Also, make sure to write **legibly** and **dark enough** and **not too close to the edges of the paper**.

- By default, write your answers only in the space provided. The extra blank sheets can be used for your solution, but **clearly indicate** in the problem if you want the extra sheets to be graded.

- Cross out / erase irrelevant scratch work. If you write incorrect statements without crossing them out, you may lose points. **Make clear what your final answer is.**

- Answers should always have explanations. **You may lose points otherwise.**

- If you finish early, double-check your work and make sure you followed the above instructions. When you're ready, you may turn it in and leave.

- To turn in exam, show your ID and make sure your name is checked off the list.

Good luck!