

Math 188, Fall 2022

Study guide for Midterm 1

- The exam is in-class on October 18.
- There are no notes or books allowed.
- I will provide paper, so do not bring a blue book.
- Content: everything in first 5 lectures. In my notes, this is everything through §2.4.

You can find Midterm 1 from Math 184, Fall 2018 here:

<https://mathweb.ucsd.edu/~ssam/old/19F-184/old/mt1.pdf>

The topics are different, but it might help.

Here is what I expect you to know for the exam.

- All homework problems from Homeworks 1 and 2 (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) Solving a linear recurrence relation (homogeneous and simple examples of non-homogeneous)
 - (2) Formal power series: addition, multiplication, derivatives, limits, composition, writing as rational function when possible, geometric series
 - (3) Evaluating binomial and multinomial coefficients, sums related to binomial and multinomial theorems
- 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) General form of solution to homogeneous linear recurrence relation (repeated roots, non-repeated roots, etc.)
 - (2) When is a power series invertible?
 - (3) General form of binomial theorem
 - (4) Number of subsets and multisets
 - (5) Interpretation of multinomial coefficients for counting objects with different colors
 - (6) Theorem 2.24 (and its corollary) on relationship between linear recurrence relations and rational functions.
- 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 above 3 categories), but they will help you with all of the above.