

MATH 447/647: Probability Models
Fall 2020 Semester
Guidelines for Final Report

Overview: Students in MATH 647 will pick a topic related to the course material, preferably in their field of interest, and write an expository report. The reports are due

December 14, 2020 at 12:00pm (noon) EST

before our final meeting that evening. I will circulate your reports to the class.

Instructions: The report should have four components:

- Part 1: Introduce the topic, reviewing its history and larger context.
- Part 2: Describe a related mathematical method, stating definitions and theorems.
- Part 3: Illustration of the method in an example.
- Part 4: Discuss in your own words what you find interesting about this topic and how it might be relevant to your current graduate work.

The report should be written in the following manner:

- Write the report as if *the person reading the report is one of your classmates in our course*. Specifically, you can assume that the reader knows all the definitions in the theory of probability models which we have learned so far.
- Your report should be equivalent to a single lecture's worth of material.

Format: The report should be typed, at least 3 pages, and cite at least 3 references using citation conventions standard in your field. Please email me your report as a .pdf file.

Topics: There are three types of topics you can pick:

1. *A topic which is not on our syllabus and not in our textbook.* You are encouraged to think out of how Probability Models is relevant to your interests. If you want to explore a topic not in [Ross], we can work together to find you appropriate references, results, and examples suitable for a short report. For example, [Ross] does not discuss the important problem of finding Markov chain mixing times. This topic would be a great starting point for a report and only requires §1-4 to get started.
2. *A topic which is not on our syllabus but is in our textbook.* There are many interesting topics in [Ross] which we do not cover in MATH 447/647. If you see anything that interests you, pick one or two subsections and expand on them by researching online for further references. Among such topics, one particularly relevant for the next course MATH 448/648 is §11 on Simulation. Many subsections in §11 only require §1-2.
3. *A topic which is on our syllabus and in our textbook.* In many of the sections of [Ross] which we covered in class, the reading features detailed, longer examples which we do not have time to cover in class. One particularly important such example is Example 4.25 on the Hardy-Weinberg Law in Genetics. This would be another great starting point for a report and only requires §1-4 to get started.