Spring 2025

WEEK 4 STUDY GUIDE

The Big Picture

Expectation is the most important concept in this course. Do not skip this week's sessions.

- The most powerful property of expectation is additivity. We will cover many and varied uses of this.
- Expectation is used in the definition of the bias of an estimator, and hence also in the construction of unbiased estimators.
- In multi-stage experiments, expectation can be calculated iteratively by conditioning.

Week At a Glance

Mon 2/10	Tue 2/11	Wed 2/12	Thu 2/13	Fri 2/14
	Lecture	Sections	Lecture	Mega Sections
Lab 3A Due Lab 3B (Due 12 PM noon Tues 2/18)			Lab 3B party 9AM - 12AM	
HW 3 Due HW 4 (Due 12 PM noon Tues 2/18)				HW 4 party 2-5
Skim Sections 8.4, 8.5	**Important:** Work through Sections 8.4, 8.5	Review Chapter 8; Skim Sec 9.1 and 9.2	Skim Chapter 9	Work through Chapter 9

Reading, Practice, and Class Meetings

Book	Topic	Lecture: Michael	Section: TAs	Optional Additional Practice
8.4, 8.5	**Additivity of Expectation** - 8.4 is about additivity: the expectation of a sum is the sum of the expectations, regardless of dependence or independence. Hugely powerful. - Additivity helps us construct unbiased estimators based on averages - 8.5 uses additivity to develop the method of indicators for finding expected counts	Tue 2/11 - Additivity and some consequences: - Constructing unbiased estimators - Finding expected counts	Wed 2/12 - Ch 8 Ex 11, 12, 9, 8	Chapter 8 All the exercises not covered in section
Ch 9	**Expectation by Conditioning** - 9.1 is the old multiplication rule combined with recursion, to find probabilities quickly - 9.2 shows how to find expectation by conditioning, building on the familiar calculation of finding an overall average as a weighted average of group averages - 9.3 has examples in the context of i.i.d. Bernoulli trials	Thu 2/13 - Probabilities and expectation by conditioning and recursion	Friday 2/14 - Ch 9 Ex 1, 2, 4	Chapter 9 All the exercises not covered in section