



Fall 2026

WEEK 4 STUDY GUIDE

The Big Picture

The most important week of the course. It's about expectation, which can be thought of as a kind of center of the distribution of a random variable, or a good guess for the variable. All probabilities are expectations, the variance of a random variable is an expectation, and least squares predictors are expectations. So please pay careful attention this week.

- Expectation is the average of the possible values, weighted by their probabilities. Care is needed for variables that have infinitely many values.
- The definition helps us calculate some expectations, but almost always we calculate expectation using its properties, just as we calculate derivatives using properties of derivatives instead of the definition.
- The two most powerful properties are additivity and the method for finding the expectation of a function of a random variable.
- Expectation is used in the definition of the bias of an estimator, and hence also in the construction of unbiased estimators.

Week At a Glance

Mon 9/14	Tue 9/15	Wed 9/16	Thu 9/17	Fri 9/18
	Lecture	Sections	Lecture	Mega Sections
HW 3 Due 5 PM HW 4 (Due 5 PM Mon 9/21)				HW 4 Party 1 PM - 4 PM
Lab 1B Due 5 PM Lab 2 (Due 5 PM Mon 9/21)			Lab 2 Party (plus OH) 4 PM to 6 PM	
Work through 8.1, skim 8.2	Work through 8.1-8.3	Skim 8.4	Work through 8.4, 8.5	Review Chapter 8

Reading, Practice, and Class Meetings

Book	Topic	Lectures: Prof. A.	Sections: TAs	Optional Additional Practice
Ch 8	Expectation - 8.1 has the definition, interpretation, and a note on existence - 8.2 calculates the expectations of some of the famous distributions, in one case by introducing a new way of calculating expectation - 8.3 shows how to calculate expectations of linear and nonlinear functions of random variables - Introduction to 8.4: The key property of additivity	Tuesday 9/15 - Focused on 8.1-8.3 - Fine points, nonlinear functions, and some surprises	Wednesday 9/16 - Selections from HW 4	Chapter 8 All exercises. Start with 2, 4, 6.
	- 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	Thursday 9/17 - Additivity and some consequences: - Constructing unbiased estimators - Finding expected counts	Friday 9/18 - Ch 8 Ex 8, 9, 11, 12	

This is one of the few weeks in which we cover just one chapter.