Spring 2023

WEEK 5 STUDY GUIDE

The Big Picture

You can think of a *stochastic process* as a random process indexed by time. A Markov chain is a stochastic process with a particular dependence structure that allows it to be used as a simple model in many settings.

- Under conditions that are pretty general, Markov chains run for a long time have powerful long-run properties.
- *Steady state* or *stationarity* has a physical interpretation and many uses.
- Many Markov chains, when run for a long time, exhibit different kinds of *balance*. These can be used to identify steady state properties.

Week At a Glance

Mon 2/13	Tue 2/14	Wed 2/15	Thu 2/16	Fri 2/17
	Lecture	Sections	Lecture	Sections
Lab 3A Due Lab 3B (Due Mon 2/20)			Lab 3B Party 10-12	
HW 4 Due HW 5 (Due Mon 2/20)				HW 5 Party 3-5
Skim Sections 10.1, 10.2,	Happy Valentine's Day! Forget 140.	Skim Chapter 10, Section 11.1	Work through Chapter 10.	Work through Section 11.1.

Reading, Practice, and Live Sessions

Book	Topic	Lectures: Prof. A.	Sections: GSIs	Optional Additional Practice
Ch 10	**Markov chains** - 10.1 introduces terminology, notation, and basics, along with a computational approach to the long run - 10.2 narrows down the type of chain we'll be studying, but even the narrowed-down group is large and interesting - 10.3 takes a more theoretical approach to the long run	Tuesday 2/14 - Introduction to Markov chains - Long run behavior	Wednesday 2/15 - Ch 9 Ex 5 - Ch 11 Ex 1, 2	None. There are no exercises in Ch 10. All the Markov Chains exercises are in Ch 11, at which point you'll have techniques that make some of the solutions easier.
Ch 11	**Balance, and a Markov model** - Review of "balance" from 10.3 - 11.1 is about different kinds of balance, and how one of them can make it easy to identify the other - 11.2 solves the code-breaking problem with a tiny alphabet, by complete enumeration	Thursday 2/16 - Different kinds of balance - An approach to code breaking, based on Markov Chains	Friday 2/17 - Ch 11 Ex 3, 4, 5	Chapter 11 All the textbook's own exercises in Ch 11 will be done in section. The Konstantopoulos exercises listed after Ex 5 come with complete solutions.