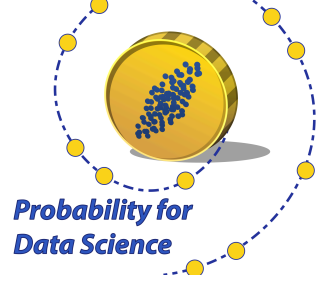


DATA 140



Spring 2024

WEEK 8 STUDY GUIDE

The Big Picture

We move to random variables with a continuum of values.

- The normal is a continuous curve that acts as a probability distribution. We formally define the *density* of a random variable with a continuum of values, and extend the concepts of cdf and expectation to this situation.
- Along with the normal, we study two major distribution families: the uniform and the exponential.
- We know how to find expectations of a function of a random variable. We now examine how to find the density of a function of another random variable that has a known density, and notice that we have to be careful when the function isn't monotone.
- An important transformation results in the process on which simulation of random variables is based

Week At a Glance

Mon 3/4	Tue 3/5	Wed 3/6	Thu 3/7	Fri 3/8
	Lecture	Sections	Lecture	Mega Sections
Lab 5 due Lab 6A (due Mon 3/11)			Lab 6A Party (9 AM - 11 AM)	
HW 7 Due HW 8 (Due Mon 3/11)				HW 8 party (2 PM to 4 PM)
Skim Section 15.1	Work through Sections 15.1, 15.3, 15.4	Skim Section 16.1	Work through Chapters 15 and 16	Work through Chapters 15 and 16

Reading, Practice, and Class Meetings

Sections	Topic	Lectures: Prof. A.	Sections: TAs	Optional Additional Practice
Ch 15	<p>Random Variables with Densities</p> <ul style="list-style-type: none"> - 15.1-15.2 define a “continuous” probability histogram, and generalize the concept of density from Data 8 histograms - 15.3 covers expectation (including variance) and has examples including the uniform distribution family - 15.4 covers the exponential distribution family - 15.5 shows how to do calculus in SymPy, included in your lab 	<p>Tuesday 3/5</p> <p>Random variables on a continuum of values: extending all previous concepts to this case, and recognizing a benefit of the continuous world: single points don't affect probability calculations</p>	<p>Wednesday 3/6</p> <p>Ch 15: - Ex 1, 3, 5</p>	<p>Ch 15</p> <p>- 2, 9, 10, 11</p>
Ch 16	<p>Densities of Transformations</p> <ul style="list-style-type: none"> - 16.1 is about linear transformations; understanding this helps understand the non-linear case - 16.2 is about monotone transformations, linear or non-linear - 16.3 is for you to read, referring to Parts 3 and 4 of Lab 4: it's the process by which you can generate random variables with a specified distribution - 16.4 takes care of the non-monotone case, with particular reference to the square; in a typical semester, students read this one themselves too 	<p>Thursday 3/7</p> <p>- Densities of transformations</p>	<p>Friday 3/8</p> <p>Ch 16: - Ex 1, 4, 6a</p>	<p>Ch 16</p> <p>- All the exercises not covered in section. Be careful about signs in Ex 6b.</p> <p>Ex 7 is a brain-teaser.</p>