Outline

Who am I?

- **Jingchen (Monika) Hu**

- Joined Vassar in 2015
  - Ph.D. in Statistics, Duke University, Durham, NC
  - B.S. in Computing Mathematics, City University of Hong Kong, China

- Research and teaching interests:
  - Bayesian statistics (MATH 347)
  - Data confidentiality: class survey example (Intensive Spring 2020)
  - I love teaching MATH 241! This is my 4th time to teach this class.

Who are you all?

- Introduce yourself to your neighbor (name, year, major/correlate)
- Why are you taking MATH 241 Probability?
- What you want to get out of MATH 241 Probability?

One question for you!

Draw two socks at random, without replacement, from a drawer full of twelve colored socks:

6 black, 4 white, 2 purple

Let B be the number of Black socks, W the number of White socks drawn.

Then the distributions of B and W are given by:

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Formally - $P(B=k)=\frac{\binom{6}{k}\binom{6}{2-k}}{\binom{12}{2}}$ and $P(W=k)=\frac{\binom{4}{k}\binom{8}{2-k}}{\binom{12}{2}}$

Combinatorial Analysis (Chapter 1) & Axioms of Probability (Chapter 2)

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What's the probability of $B=0$ and $W=0$ (i.e. $P(B=0,W=0)$)?
What's the probability of $W=0$ given that we know $B=0$ (i.e. $P(W=0 \mid B=0)$)?

Jointly Distributed Random Variables (Chapter 6)

One more question for you! - last one, I promise

Let X and Y have independent Uniform$(0, 1)$ distribution. Find the distribution of $X + Y$.

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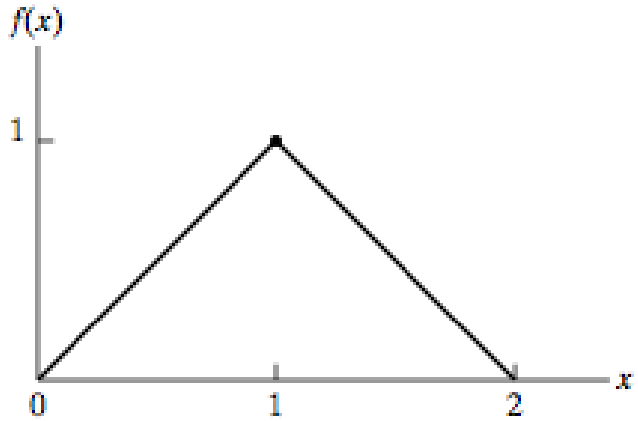

$$f_{X+Y}(z) = \begin{cases} z & \text{if } 0 < z \leq 1 \\ 2 - z & \text{if } 1 < z < 2 \\ 0 & \text{otherwise} \end{cases}$$

Jointly Distributed Random Variables (Chapter 6)

Topics to cover

- Chapter 1 Combinatorial Analysis
  - Permutations & Combinations, Binomial & Multinomial coefficients
- Chapter 2 Axioms of Probability
  - Sample space and events, axioms of probability
- Chapter 3 Conditional Probability and Independence
  - Conditional probabilities, Bayes' formula, independent events

Midterm I, week of 3/21 - 3/28, take-home open-book open-notes.

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- Chapter 4 (Discrete) Random Variables
  - Expectation & variance (sum), Bernoulli, Binomial, Poisson, Geometric distributions, NY quick draw game
- Chapter 5 Continuous Random Variables
  - Expectation & variance (integral), Uniform, Normal, Exponential, Gamma distributions

Topics to cover cont'd

- Chapter 6 Jointly Distributed Random Variables
  - Joint distribution, independent random variables, sum of IRV, conditional distribution

Midterm II, week of 5/3 - 5/10, take-home open-book open-notes.

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- Chapter 7 Properties of Expectation
  - Properties of expectation, covariance and correlation, moment generating functions
- Chapter 8 Limit Theorems
  - Markov's and Chebyshev's inequalities, Central Limit Theorem (CLT) and law of large numbers (LLN)

  Final exam, TBA.

Outline

General Info

Classroom:	Zoom
Time:	Section 01: TTh 9:00am - 10:15am
	Section 02: TTh 10:30am - 11:45am
Instructor:	Jingchen (Monika) Hu *jihu@vassar.edu*
Office:	Zoom
Office hours:	Tuesdays 10:00am - 11:30am
	Wednesday 10:00am - 11:30am
	or by appointment (link on Moodle)
Textbook:	A First Course in Probability, 9^{th} Edition
	Sheldon M. Ross, Prentice Hall
Website:	Moodle (course material: slides and homework etc.)
	Google Drive (schedule and surveys etc.) and Slack
Workload:	On average 6-8 hours every week outside of class

Grading

Homework	15%
Quizzes	10%
Weekly check-ins and team work solutions	10%
Midterms (20% $\times$ 2)	40%
Final Exam	25%

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- Grades curved at the end of the course after overall averages have been calculated.
  - Average of 90-100 guaranteed A-.
  - Average of 80-90 guaranteed B-.
  - Average of 70-80 guaranteed C-.
  - Average of 60-70 guaranteed D-.
- The more evidence there is that the class has mastered the material, the more generous the curve will be.

General course schedule

- Fully remote.
- Recorded lectures (no class on Tuesdays).
- Live sessions, work in teams (every Thursday).
- Weekly check-ins due every Sunday 11:59pm EST.
- Homework due Sunday 11:59pm EST (in the week it is due).
- Quizzes in-class on Thursdays.
- My office hours: Tuesdays 10:00 - 11:30am & Wednesdays 10:00 - 11:30am, or by appointment.
- I also check our Slack channel at least once a day - ask me or your fellow students any questions you have on Slack!

Recorded lectures

- Roughly 5 - 8 recorded lectures for each week.
- Available before Monday when a week starts.
- Lecture slides for recorded lecture videos posted on Moodle.

Live sessions

- Every Thursday during scheduled class meeting time (required).
- Students work in teams.
- A list of exercises will be posted before session starts.
- Each team is responsible to provide solutions to one exercise by Sunday 11:59pm EST, Moodle submission.
- I will provide my solutions after students' submission.
- Students receive a participation grade
  - attending live session
  - work in teams
  - submit team solutions (each student needs to make a submission on Moodle)

Homework

- About 8 homework assignments.
- Due Sunday 11:59pm in the week it is due.
- Posted on Moodle for the week it is due (cover page and questions).

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- No make-ups.
- Dispute about the grading has to be filed within one week after they are returned.
- Answer keys to homework will posted on Moodle after the homework is due.

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- Answer keys to homework will posted on Moodle after the homework is due.
- Late homework policy:
  - next day: lose 30% of points
  - later than next day: lose all points

Quizzes

- About every other week.
- In-class on Thursdays, about 10-15 minutes.
- Open-book and open-notes.
- Date and topics will be announced in advance.

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Weekly-check-ins

- Every week.
- Due Sunday 11:59pm EST, starting from this week.
- Link on Moodle.
- Students earn participation grade after completing each weekly check-in.

Exams

- Midterm I: *week of 3/21 - 3/28*, take-home open-book open-notes.
- Midterm II: *week of 5/3 - 5/10*, take-home open-book open-notes.
- Final: *TBA by Registrar, during finals week*, take-home open-book open-notes.

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- Final: *TBA by Registrar, during finals week*, take-home open-book open-notes.
- No make-up for missed exams.
- For the students who have at least 2 other final exams on the same day, notify me at least one week before the final exam day so that I can accommodate your schedule individually.

Other policies

- All regrade requests on homework, quizzes and exams must be discussed with the instructor within one week of receiving your grade.
- There will be no grade changes after the final exam.
- Academic integrity

Tips for success

1. Do the homework - start early.
2. Read the relevant sections before class, and review after the lectures.
3. Watch the assigned instructional videos, and rewatch them if necessary.
4. Be an active participant during lectures.
5. Ask questions - during class or office hours.
6. Prepare good cheat sheets for exams.
7. Do not procrastinate.

Announcement

- Class survey: *due Sunday 2/21*
  Moodle course page $\longrightarrow$ Class survey
- Weekly check-in for week 1: *due Sunday 2/21*
  Moodle course page $\longrightarrow$ Week 1 (2/17 - 2/21) $\longrightarrow$ weekly check-in
- HW1: *due Sunday 2/28*
  Moodle course page $\longrightarrow$ Week 2 (2/22 - 2/28) $\longrightarrow$ Homework 1