

# Math 339SP, Spring 2024 — Homework 1

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Due February 2 at 5:00 pm

**Instructions.** This problem set covers material from Week 1 of class, with a focus on Chapters 1 and 2 of the textbook.

**Problem 1.** Try the following exercises from Chapter 1. These are just a little more review of conditional probability. Remember that

$$P(A | B) = \frac{P(A \cap B)}{P(B)}$$

when  $P(B) > 0$  (this is the definition of conditional probability) and

$$P(B | A) = \frac{P(A | B)P(B)}{P(A)}$$

when  $P(A) > 0$  (this is called Bayes' formula).

1. Exercise 1.2
2. Exercise 1.3
3. Exercise 1.4
4. Exercise 1.6
5. Exercise 1.9

**Problem 2.** Try the following exercises from Chapter 2. These are practice with constructing the transition matrix for concrete examples, as well as practice using the idea that  $P^n$  gives you  $n$ -step transition probabilities.

1. Exercise 2.2 (feel free to use R to do matrix multiplication for you; we'll discuss using R on Tuesday of Week 2)
2. Exercise 2.5 (again, you can use R to do matrix multiplication)
3. Exercise 2.8 (make sure to read the definition of random walk on a weighted graph in Example 2.11)
4. Exercise 2.12 (only do the case  $k = 5$ ; start by determining the state space, and then fill in the matrix one row at a time)
5. Exercise 2.14 (only do the case  $k = 5$ ; start by determining the state space, and then fill in the matrix one row at a time).