Homework 4

BSTA 550

2023-10-26

Complete all of the problems listed below. Only turn in the ones listed in the "Turn In" column. Please submit problems in the order they are listed.

You must show all of your work to receive credit. Don't forget to define every r.v. you use! In particular, ***if a similar problem was done in class or an example in the book, make sure to still show every step in the solution and not just cite the examples' results****.*

Chapter	Turn In	Extra Problems
10*	TB # 6, 8, NTB # 1	# 1, 10, 11, 14, 17
11**	TB # 20, NTB # 2, 3	# 1, 2, 9***, 17***, 18***

* Use Chapter 10 techniques when computing expected values for Chapter 10 problems, i.e. computing the expected value directly using the definition of $\mathbb{E}[X]$.

** Use Chapter 11 techniques when computing expected values for Chapter 11 problems, i.e. expressing the r.v. as a sum of other r.v.'s and calculating the expected value of the sum of r.v.'s. Also, as I mentioned in class and posted on Sakai, we will be skipping the more complex examples of finding expected values using indicator r.v.'s. You can skip Examples 11.5, 11.10, and 11.11. We will not be covering these techniques.

*** Although Chapter 11 exercises, these are to be done using Chapter 10 techniques since we aren't covering the more complex examples of finding expected values using indicator r.v.'s.

Non-textbook problems (NTB)

1. **Forgetful mornings revisited again**. Recall from Chapter 9 #2, that X is the number of days until Maude loses her cell phone and each day she has a 1% chance of losing her phone (her behavior on different days being independent). For this problem, ignore the r.v. Y, and consider the r.v. X on its own.

a. What is the pmf of X?

b. Use the pmf of X to find $\mathbb{E}[X]$.

2. Approximately 10% of U.S. Veterans are women. Suppose an investigator plans a study with 4500 participants that are Veterans. How many women can they expect to be included? *Your answer must be calculated by defining a random variable and showing how to calculate the expected value.*

3. **Cashews revisited**. Recall from Chapter 10 #8, that a bowl contains 30 cashews, 20 pecans, 25 almonds, and 25 walnuts, and 3 nuts are randomly selected to eat (without replacement). Again, find the expected value of the number of cashews, but this time by defining the number of cashews as a sum of random variables.

Some select answers

Selected answers (or hints) not provided at the end the book:

- Chapter 10
  - # 6: 750.5
  - # 8: 0.9
  - # 10: 201
  - # 14: (a) 1.875 (b) 3.125
- Chapter 11
  - # 2: 1.6
  - # 18: a) 48.5 (b) 96
  - # 20: ≈ 23.077