

# Homework 1

BSTA 550

2023-10-05

## Homework Structure

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.*

Chapter	Turn In	Extra Problems
1		# 3, 7, 9, 11
2	NTB # 1, TB # 30	# 1, 4, 8, 16, 19, 23
22*	TB # 42, NTB # 2	# 3, 5, 7, 25, 27, 30, 31, 39-41, 43-48

\* Please note the following for Chapter 22:

- See the table on pg. 277, which summarizes some key combinatorics concepts.
- Problems 39-48 are a set that build on one another and more advanced than the other problems. It'll be much easier to do #42 after doing 39-41.
- I *highly* recommend reading Chapter 23, which is a series of case studies in counting: poker hands and Yahtzee.

## Non-textbook problems (NTB)

1. Suppose the following are the percentage of US adults with the following conditions:
  - A: Hypertension 33%
  - B: Diabetes 9%
  - C: Metabolic syndrome 24%

- $A$  or  $B$ : 39%
  - $A$  or  $C$ : 45%
  - $B$  or  $C$ : 28%
  - $A$  or  $B$  or  $C$ : 48%
- a. Make a Venn diagram of the 3 conditions labeling the percentage (or probability) for ALL of the 8 “sections”. *Hint: Start from the last condition and work your way up!*
- b. For each of the following (1. - 7. below), (i) write out the event using unions, intersections, and/or complements of the events  $A$ ,  $B$ , and  $C$  (this is NOT finding the probability, that’s in ii); (ii) find the probability of the event; and (iii) write a sentence explaining what the probability is of in terms of the context of the problem.
1.  $\mathbb{P}(\text{event at least one of the 3})$
  2.  $\mathbb{P}(\text{event none})$
  3.  $\mathbb{P}(\text{event } A \text{ only})$
  4.  $\mathbb{P}(\text{event exactly one})$
  5.  $\mathbb{P}(\text{event } A \text{ and } B)$
  6.  $\mathbb{P}(\text{event } A \text{ and } B \text{ but not } C)$
  7.  $\mathbb{P}(\text{event all 3})$

2. The German word for probability theory is

*W A H R S C H E I N L I C H K E I T S T H E O R I E*

If the letters in this word are arranged at random,

- a. what is the probability that none of the H’s will be adjacent?
- b. what is the probability that not all of the H’s will be adjacent?

### Some select answers

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

- Chapter 2
  - # 4: 0.35
  - # 8: 0.03125
  - # 16: 0.48
  - # 30: (a) 0.189      (b) 0.811      (c) 0.189

- Chapter 22

- # 30: (a) 2,835    (b) 405    (c) 10,780    (d) 7,980
- # 40: 0.6666667
- # 42: 0.002116402 (This is the answer when  $n = 5$ . Your answer needs to be in terms of  $n$ .)
- # 44: 0.3
- # 46: 0.3333333
- # 48: 0.007936508 (This is the answer when  $n = 5$ . Your answer needs to be in terms of  $n$ .)