Homework 3

BSTA 550

2023-10-19

Directions

Please turn in this homework on Sakai. Please submit your homework in pdf format. You can type your work on your computer or submit a photo of your written work or any other method that can be turned into a pdf. Please let me know if you greatly prefer to submit a physical copy. We can work out another way for you to turn in homework.

Try to complete all of the problems listed below at some point this quarter! You may want to save some of them for studying later! Only turn in the ones listed in the "Turn In" column. Please submit problems in the order they are listed.

The more work you include that shows your thought process, the more I can give you feedback.

Chapter	Turn In	Extra Problems
5	TB # 17, NTB # 1	# 1, 9, 11
7		# 2, 10, 16, 17, 18
8	TB # 8*, 18*	# 2, 5, 7, 10

* In addition to the graphs, include piecewise defined functions for the pmf and cdf.

** Break up your solution to Chapter 9 #8 into the following 5 parts:

1. Make a table of the joint probabilities for X and Y.
2. Using the table in the previous part, write down the piecewise-defined equation for $p_{X,Y}(x, y)$. There should be only 3 pieces (cases) for $p_{X,Y}(x, y)$.
3. Express $p_Y(y)$ as a formula (i.e. a function in terms of y).
4. Find the conditional pmf $p_{X|Y}(x|y)$ and express your answer as a piecewise-defined equation. There should be only 3 pieces (cases) for $p_{X|Y}(x|y)$.

5. Make a table of the joint cdf $F_{X,Y}(x, y)$ values.

Non-textbook problems (NTB)

1. A new drug is packaged to contain 30 pills in a bottle. Suppose that 98% of all bottles contain no defective pills, 1.5% contain one defective pill, and 0.5% contain two defective pills. Two pills from a bottle are randomly selected and tested. What is the probability that there are 2 defective pills in the bottle given that one of the two tested pills is defective?

Some select answers

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

- Chapter 5
  - NTB #1: 0.392
- Chapter 7
  - # 2: $X \in (0, \infty)$, continuous; $Y \in \{0, 1, 2, ...\}$, discrete
  - # 10: $X_j \in [0, \infty), j = 1, \ldots, 100$; $Y \in [0, \infty)$; both continuous
  - # 16: Y could be 0
  - # 18: Yes, a r.v. can be both. Give an example!
- Chapter 8
  - # 2: (a) $p(x) = \binom{7}{x}(.5)^7$ for $x = 0, 1, 2, \ldots, 7$
  - # 9: (a) $c = \frac{1}{8}$
  - # 10:

x	2	4	6	8
$p(x)$	3/10	1/2	3/20	1/20