UCONN
UNIVERSITY OF CONNECTICUT

Department of Statistics
College of Liberal Arts & Sciences

STAT 3375Q: Introduction to Mathematical Statistics I

Spring 2024

Quiz 3 Review Exercises Quiz Date: 28 February 2024

INSTRUCTIONS:

- The quiz is consist of only one problem taken from this list of five problems.
- This is a closed book, closed notes, closed laptop/computer quiz.
- The duration of the quiz is 15 minutes.
- The material for the quiz is Lectures 8, 9, and 10 and the homework exercises.
- A calculator is not necessary. You can keep your final answers as fractions in the simplest form.
- To merit partial points, make sure to justify/explain your thoughts and solutions, using notation and terminology properly, and clearly defining any events and random variables that you use.
- Do not be late. The quiz will start at exactly 4:40pm and end at 4:55pm.

Problem 1
Let X have a PDF defined by

$$f(x) = \begin{cases} cxe^{-x}, & x \geq 2, \\ 0, & \text{elsewhere.} \end{cases}$$

a) Find the constant c.

b) Find $P(1 \leq X \leq 3)$.

Solution:

Problem 2
Let X denote a continuous random variable with PDF

$$f(x) = \begin{cases} \frac{x}{8}, & 0 < x < 4 \\ 0 & \text{otherwise.} \end{cases}$$

Define Y to be the integer that is closest X.

a) Explain why Y is a discrete random variable and give possible values for Y.

b) Compute the PMF of Y.

Solution:

Problem 3
Divide a stick into two parts. Find the probability that the larger part of the stick is at least three times the shorter.

Solution:

Problem 4
Suppose we have the following function:

$$f(y) = \begin{cases} c\left(\frac{1}{2} - y^2\right), & -1 \leq y \leq 1, \\ 0, & \text{elsewhere.} \end{cases}$$

Is this a valid PDF? If not, is there a c for which this becomes a valid PDF?

Solution:

Problem 5
Derive the PDF of $|X|$ where $X \sim U(-1, 1)$.

Solution: