UCONN
UNIVERSITY OF CONNECTICUT

Department of Statistics
College of Liberal Arts & Sciences

STAT 3375Q: Introduction to Mathematical Statistics I

Spring 2024

Quiz 2 Review Exercises Quiz Date: 7 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 4, 5, and 6 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
Prove that for a random variable X with expected value $E(X) = \lambda$,

$$V(X) = E\{X(X-1)\} + \lambda - \lambda^2.$$

Solution:

Problem 2
A manufacturer is sending 10 boxes out for shipment today. Unfortunately, some of the boxes have defective items.

Box #	1	2	3	4	5	6	7	8	9	10
# of defective items	0	0	1	0	2	2	0	0	1	3

a) One of these boxes is to be selected at random for shipment to a particular customer. Let X be the number of defective items in the selected box. What is the probability distribution of X.

b) What is the expected value of defective items?

c) Another manufacturer is known to have X^2 defective items in each of the boxes numbered 1 to 10. If this manufacturer sends out a randomly selected box, what is the expected number of defective items the customer will receive?

Solution:

Problem 3
Suppose the random variable X takes on possible values $x = 0, 1, 2$ and has a probability mass function $f(x) = \frac{2x+3}{k}$, determine the value of k.

Solution:

Problem 4
A box contains 5 red and 5 blue marbles. Two marbles are drawn randomly. If they are the same color, then you win \$1.10. If they are different colors, you lose \$1.00. Compute

a) the expected value of the amount you win

b) the variance of the amount you win

Solution:

Problem 5
If $E(X) = 1$ and $V(X) = 5$, find

a. $E\{(2 + X)^2\}$

b. $V(4 + 3X)$

Solution: