STA 504 Mathematical Statistics with Calculus Review

Midterm Exam #2

11/20/2023

Due: **9:00 AM, 11/21/2023** (Tuesday)

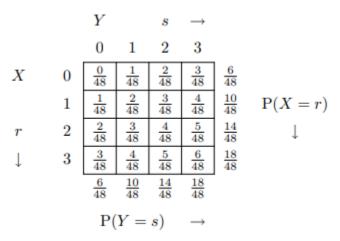
Please Print:		
	(First Name)	(Last Name)

Instructions

- This is an open-book test. Textbooks and notes can be used. However, you must complete this exam independently. All forms of collaboration are NOT allowed.
- Please show your detailed work to earn full credit.
- Partial credit will be granted to the key steps that reflect your correct reasoning even if your numerical answer is incorrect.

Problem 1.

Consider two discrete random variables X and Y whose values are r and s respectively and suppose that the joint probability distribution is given by:



Answer the following questions based on the above distribution table.

1. Are *X* and *Y* independent?

2. E[X + Y]

3. E[XY]

4. COV(X, Y)

Problem 2.

Let X be the total time that a customer spends at a bank, and Y the time she spends waiting in line. Assume that X and Y have joint density

$$f(x,y) = \begin{cases} 4e^{-2x}, & 0 \le y \le x < \infty \\ 0, & \text{elsewhere} \end{cases}$$

Sketch the domain or related regions whenever appropriate.

1. Find the marginal density functions of X and Y.

2. Are *X* and *Y* independent?

3. Find out the mean service time: E[X - Y].

4. Find the probability P[X - Y > 2]

5. Find the variance of X - Y.

6. Find the correlation coefficient between X and Y.

7. Given that waiting time Y = 2, what is E[X|Y = 2]?