**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:

Table

Description automatically generated

Answer the following questions based on the above distribution table.

1. Are and independent?

**Problem 2.**

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

Sketch the domain or related regions whenever appropriate.

1. Find the marginal density functions of and .
2. Are and independent?
3. Find out the mean service time: .
4. Find the probability
5. Find the variance of .
6. Find the correlation coefficient between and .
7. Given that waiting time , what is