Program: BTech / MTech TA / MTech RA / PhD (Tick one)



Al5030: Probability and Stochastic Processes

Quiz 5

DATE: 14 NOVEMBER 2024

Question	1(a)	1(b)	2	Total
Marks Scored				

Instructions:

- Fill in your name and roll number on each of the pages.
- You may use any result covered in class directly without proving it.
- Unless explicitly stated in the question, DO NOT use any result from the homework without proof.

Fix a probability space $(\Omega, \mathcal{F}, \mathbb{P})$.

Assume that all random variables appearing in the questions below are defined with respect to \mathscr{F} .

1. Let X and Y be jointly continuous, with

$$f_{X,Y}(x,y) = \begin{cases} cy, & -1 \leq x \leq 1, \ 0 \leq y \leq |x|, \\ 0, & \text{otherwise}. \end{cases}$$

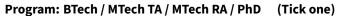
(a) **(1 Mark)**

Determine the constant c.

(b) (2 Marks)

Compute Cov(X, Y).

Name: Roll Number: Department:





2. (2 Marks)

Let $X_1, X_2, \ldots \overset{\text{i.i.d.}}{\sim}$ Exponential(1), and let $N \sim \text{Geometric}(1/2)$ be independent of $\{X_1, X_2, \ldots\}$. Let $S_N = \sum_{i=1}^N X_i$. Compute $\mathbb{E}[S_N \mathbf{1}_{\{N=4\}}]$. Justify your steps clearly.