Indian Institute of Technology Kanpur

Introduction to Probability Theory (MSO205)
Quiz 2

Time: 7 PM to 7.45 PM **Date:** October 30, 2025 **Maximum Marks:** 20

Name: **Roll Number:**

Question 1: Let $X = (X_1, X_2)$ be a bivariate continuous random vector with joint p.d.f. given by

$$f_X(x_1, x_2) = \begin{cases} 1, & \text{if } 0 < |x_2| \leq x_1 < 1 \\ 0, & \text{otherwise.} \end{cases}$$

Find the marginal p.d.f.s of X_1 and X_2. Are X_1 and X_2 independent random variables? Justify your answer.

Points: $2 \times 3 + 3 = 9$

Question 2: Let X and Y be i.i.d. random variables associated with normal distribution with mean $= 0$ and variance $= 1$. Do $\frac{X}{Y}$ and $\frac{X}{|Y|}$ have the same sampling distributions? Justify your answer.

Points : 6

Question 3: Let X be a random variable associated with normal distribution with mean $= 0$ and variance $= 1$. Suppose that $Y = X^{2m}$ for all $m \in \mathbb{N}$. Calculate the correlation coefficient between X and Y.

Points : 5