Quiz 1

(MA6.102) Probability and Random Processes, Monsoon 2023

Question cum Answer Booklet

28 August, 2023

Max. Duration: 45 Minutes

Max. Marks: 20

Roll Number:_____

Programme:_____

Marks Table

Q1	Q2	Q3

Question 1 (5 Marks)**.** Let A and B be two independent events. Use the definition of independence to prove that the events A and B^{c} are independent.

Question 2 (10 Marks)**.** Consider a family that has two children. Assume that every birth results in a boy with probability $\frac{1}{2}$, independent of other births and also that the parents in the family had decided to have exactly two children. Assume that if a child is a girl, her name will be Lilly with probability p independently from other child's name. If the child is a boy, his name will not be Lilly. Given that the family has at least one daughter named Lilly, what is the probability that both children are girls?

Question 3 (5 Marks)**.** Let Ω be a sample space with an associated probability law P and X be a random variable defined on Ω, with PMF P_X. Suppose Y is a function of X, i.e., $Y = f(X)$. Show that

$$P_Y(y) = \sum_{\{x: f(x)=y\}} P_X(x),$$

where $P_Y(y) \triangleq P(\{\omega \in \Omega : Y(\omega) = y\})$.

ROUGH WORK/ADDITIONAL SHEET-1

ROUGH WORK/ADDITIONAL SHEET-2