Quiz 1

Time: 20 minutes   Date: 11/09/21
Max. Marks: 10

Note: The exam is closed-book, and all the questions are compulsory.

1. Let the PMF of a random variable X is given by

$$P\{X = k\} = e^{-16}\frac{16^k}{k!}, \quad k = 0, 1, 2, \cdots, \infty.$$

Show that (a) $P\{X \leq 8\} \leq \frac{1}{4}$;   (b) $P\{X \geq 32\} \leq \frac{1}{16}$.

(3 + 3 marks)

2. Consider a probability space $(\Omega, \mathcal{F}, P)$, where $\Omega = \{(u, v) \in \mathbb{R}^2 | 0 \leq u \leq 1, 0 \leq v \leq 1\}$, and $\mathcal{F}$ is a Borel σ-field on Ω, and $P(A) = \frac{\text{area of } A}{\text{area of } \Omega}$ for every $A \in \mathcal{F}$. Define a random variable $X : \Omega \to \mathbb{R}$ such that $X(u, v) = \frac{u+v}{3}$ for all $(u, v) \in \Omega$. Find the probability density function of X.

(4 marks)