Homework part A.

5 points [2.5p: A1] + [2.5p: A2]

Deadline: week 1-6 June 2024 (the precise date is fixed by your lab teacher).

A1. (2.5 points) We have the following parameters $\lambda \in \mathbb{R}_+^*$, $p \in (0,1)$, $n, m, k \in \mathbb{N}^*$ such that $0 \leqslant k < m \leqslant n$.

(a) (1 point) Write a function that computes the probabilities corresponding to the values $k, k+1, \ldots, m$ for the following ditributions $Poisson(\lambda)$, $Geometric(p)$, and $B(n,p)$.

(b) (1 point) Write a function that graphically represents the above computed probabilities.

(c) (0.5 points) Let $Y : Poisson(\lambda)$; find the least value of $k_0 \in \mathbb{N}$ such that $P(Y \leqslant k_0) > 1 - 10^{-6}$.

A2. (2.5 points) The file "note_PS.csv" contains the grades from the Probabilities and Statistics course (on two columns headed "P" and "S", respectively) for the students in one of the previous academic years.

(a) (1 point) Write a function that opens the file, reads the data into two samples and, computes the absolute and the relative frequencies for the two samples. (*Use the function table() for computing the frequencies and the function as.vector() for extracting them.*). Then find the expectations of the two samples (viewed as random variables).

(b) (1.5 points) Write a function that determines the outliers (if any) using one of the known methods and removes them from the samples (the parameters of the function are the name of the file and the name of the sample; the function returns the trimmed sample). The same function must graphically represent the frequency distributions for the trimmed samples using the intervals $(0,1]$, $(1,2]$, $(2,3], \ldots (9,10]$.

Solutions to these exercises (the corresponding R functions and their calls) will be written in an single R script.