MATH 497 Inroduction to Machine Learning - Fall 2019

Final EXAM

Due Time: December 18, Wednesday, 4:30PM

Rules:

1. Absolutely NO discussion or communication about the Final between students
2. Students are allowed to ask questions to the Instructor (Email is preferred).
3. Students are allowed to use any books and online resources to solve the problem. But students have to solve the problem on their own. NO direct help from other people or online resources are allowed.

How to turn in your Final?

- The submitted file format must be in a Jupyter Notebook file with file type .ipynb - no any other file formats. The .ipynb file must be submitted through blackboard Assignment Link. The deadline for code submission is 4:30PM of the due date: December 18th, Wednesday.

Question:

Suppose 10 independent observations (8, 3, 4, 3, 1, 7, 2, 6, 2, 7) are observed from the model

$$X_i|\lambda \sim \text{Poisson}(\lambda)$$

A lognormal prior distribution for λ is assumed:

$$\log \lambda \sim N(\log 4, 0.5^2).$$

Implement an Acceptance-Rejection Algorithm to generate random samples from the posterior distribution of λ.

Required Output:

1. Print the posterior mean estimate for λ and its standard deviation.
2. Present the output of the algorithm by a density histogram of the samples along with its KDE.