2022년도 1학기

확률 및 통계 HW#03

Due: 2022. 04. 20

Introduction

- **Subject: computer simulation**
  - **Random number generation and distribution modeling**
  - **Comparing the mathematical distribution functions and real data**
  - **Relation between Poisson and Exponential distributions**
- **Coding language**
  - **Python (other languages are OK)**
- **Report**
  - **Power point presentation format (submission: pdf format)**
  - **Less than 20 pages**
- **Due (LMS submission)**
  - **2022. 04. 20, 23:59:59 (Wednesday)**

Poisson & Exponential Distributions

- **Poisson distribution**
  - **RV X: # of Bernoulli events (with probability p) in a time interval**
  - **Mean: λ**
- **Exponential distribution**
  - **RV T: time interval between successive two Bernoulli events**

Procedure of Poisson modeling

- **Trial 1: Random number generation**
  - **Select a specific number with p**
    - **Ex: specific number =1 in [1, 20] integers, p=0.05**
  - **Event occurrence is the specific number generation.**
- **Trial 2: Repeat the Trial 1 with 1000 times**
  - **Count the number of occurrences of the specific number**
  - **Poisson RV X: 0 ~ 1000**
- **Repeat Trial 2 1000 times**
- **Modeling Poisson distribution for 1000 experiments**
  - **Mean λ = 1000 * p, P(X=k) = $\dfrac{\lambda^k}{k!}e^{-\lambda}$**
  - **Compare the mathematical distribution and real data histogram**

How to model Exponential distribution

- **Count the number of Trial 1 between successive Bernoulli events**
  - **Regard the one Trial as a unit time interval**
  - **For total 1,000,000 Trial 1**
- **Constructing the histogram of intervals between successive events**
- **Compare the histogram with the mathematical distribution function, $f(t) = \lambda e^{-\lambda t}$**
- **How to model and compare the continuous RVs ?**
  - **PDF or CDF ?**
  - **Precision of t ?**
  - **Normalization for probability distribution ?**

Report

- **Describe your own procedures and results**
  - **Generated histograms**
  - **Comparison of mathematical functions and real distribution (histogram)**
- **Analysis of the simulation**
- **Your conclusions**

Mid test #1

- **4월 14일 1시 ~ 2시 15분**
- **On-line test**
  - **Camera setting**
  - **LMS submission**