Exercises - March 20 2019

# Exercise 0

- practice with the discrete probability distributions in R: make plots of the standard pdfs and cdfs, playing with the function parameters

# Exercise 1

- a set of measurements have been performed on the concentration of a contaminant in tap water. The following tables reports a set of values (x), with the corresponding probabilities given by the two methods ($p_1$ and $p_2$)

| x | 15.58 | 15.9 | 16 | 16.1 | 16.2 |
|---|---|---|---|---|---|
| $p_1$ | 0.15 | 0.21 | 0.35 | 0.15 | 0.14 |
| $p_2$ | 0.14 | 0.05 | 0.64 | 0.08 | 0.09 |

- Evaluate the expected values, $E[X]$, and the variance, $Var(X)$, for both methods

# Exercise 2

- the waiting time, in minutes, at the doctor's is about 30 minutes, and the distribution follows an exponential pdf with rate 1/30

A) simulate the waiting time for 50 people at the doctor's office and plot the relative histogram

B) what is the probability that a person will wait for less than 10 minutes ?

C) evaluate the average waiting time from the simulated data and compare it with the expected value (calculated from theory and by manipulating the probability distributions using R)

B) what is the probability for waiting more than one hour before being received ?

# Exercise 3

- let's suppose that on a book, on average, there is one typo error every three pages. If the number of errors follows a Poisson distribution, plot the pdf and cdf, and calculate the probability that there is at least one error on a specific page of the book

# Exercise 4

- we randomly draw cards from a deck of 52 cards, with replacement, until one ace is drawn. Calculate the probability that at least 10 draws are needed.

# Exercise 5

- Import the file available at the URL: `https://userswww.pd.infn.it/~agarfa/didattica/AdvStat/rileseme_30062018_0_eng.csv`) and plot the number of towns per regions.