Carthage University
INSAT
Department of Mathematics & Computer Sciences

Practical works: SLLN & CLT

Practice #1:

1. Generate a vector x of 100 random numbers according to Bernoulli distribution of parameter $p = \frac{1}{2}$.
   i. Plot the series $\{\overline{x}_k : k = 1, \cdots 100\}$

$$\overline{x}_k = \frac{1}{k}\sum_{i=1}^{k} x_i.$$

2. Do the same for $p = \frac{1}{3}$ and make the plot on the same graph as before.
3. Comment.

Practice #2:

1. Generate a 100×100 matrix M of random numbers according to the uniform distribution $\mathcal{U}[0, 1]$.
2. Choose one single column x_i of the matrix M and consider its normalization $\widetilde{x_i} = \frac{x_i - \overline{x_i}}{\sigma_i}$, and plot its histogram.
3. Build the series of averages of all columns x_a and plot its histogram.
4. Comment.

Practice #3:

Reconsider Exercises #5 and #6 of Exercises sheet about convergence of random variables, by using the statistical package "R".