Exercise 1

In this exercise you should implement everything including the tests (e.g. the chi-square and KS tests) yourself. Later, when your code is working you are free to use builtin functions.

1. Write a program implementing a linear congruential generator (LCG). Be sure that the program works correctly using only integer representation.

   (a) Generate 10.000 (pseudo-) random numbers and present these numbers in a histogramme (e.g. 10 classes).

   (b) Evaluate the quality of the generator by graphical descriptive statistics (histogrammes, scatter plots) and statistical tests - χ^2, Kolmogorov-Smirnov, run-tests, and correlation test.

   (c) Repeat (a) and (b) by experimenting with different values of "a", "b" and "M". In the end you should have a decent generator. Report at least one bad and your final choice.

2. Apply a system available generator and perform the various statistical tests you did under Part 1 point (b) for this generator too.

3. You were asked to simulate one sample and perform tests on this sample. Discuss the sufficiency of this approach and take action, if needed.