Exercise 12.1

Consider the random number generators $x_i = (ax_{i-1}) \bmod (2^{13} - 1)$ with a = 81,83,85. Evaluate the period of the three generators. Use the three generators to simulate a dice, setting $N_i = (x_i \% 6) + 1$ Extract for each generator 3000 numbers. Fill a 6-bins histogram and plot it. Verify the uniformity of the corresponding distributions. Try different initial seed x1 between 1 and 8190.

Exercise 12.2

Choose the best random number generator out of the three proposed in Ex. 1 and simulate the game Snakes and Ladders. Repeat the simulation of the game 100 times and evaluate the mean number of needed throws to reach the end (nb: one throw is the sum of two dices). Take also note of the maximum number of throws.

Repeat the simulation 10^6 times using the standard C random number generator and compare the results.