**Exercise 11. Answer Sheet**

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***Problem 1.***  (40 points) Consider constructing a random number generator for integers from 1 to 6 using the simplest linear congruential method.

1. What is the equation of this generator?

X0 = 1

Xi = 48271\*X(i-1) mod 6

b) Which values of the parameter A ∈[1, 6]give the longest sequence? Put your answer here.

***Problem 2.*** (60 points)Write a program implementing the 3 algorithms from the lecture. Upload your code.

a) (20 points) Fill the following table with the first 5 random numbers generated by each of the algorithms?

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 1 | 2 | 3 | 4 | 5 |
| Rand1 |  |  |  |  |  |
| Rand2 |  |  |  |  |  |
| Rand2 |  |  |  |  |  |

b) (40 points) Generate N = {10, 1000, 1000000} real random numbers in the interval (0.0, 1.0) using each algorithm. Calculate the histogram of the number distribution (in %) for 10 intervals and fill the table:

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| N | 0.0-0.1 | 0.1-0.2 | 0.2-0.3 | 0.3-0.4 | 0.4-0.5 | 0.5-0.6 | 0.6-0.7 | 0.7-0.8 | 0.8-0.9 | 0.9-1.0 |
| Rand1 | | | | | | | | | | |
| 10 |  |  |  |  |  |  |  |  |  |  |
| 1000 |  |  |  |  |  |  |  |  |  |  |
| 1000000 |  |  |  |  |  |  |  |  |  |  |
| Rand2 | | | | | | | | | | |
| 10 |  |  |  |  |  |  |  |  |  |  |
| 1000 |  |  |  |  |  |  |  |  |  |  |
| 1000000 |  |  |  |  |  |  |  |  |  |  |
| Rand3 | | | | | | | | | | |
| 10 |  |  |  |  |  |  |  |  |  |  |
| 1000 |  |  |  |  |  |  |  |  |  |  |
| 1000000 |  |  |  |  |  |  |  |  |  |  |