Homework Stochastic Simulation (2018) - Second set

The deadline of this homework set is Tuesday October 30 at 09:00. For the programming exercises, you are free to use any programming language or mathematical software package (Maple/Matlab/Mathematica/R/anything) as long as you

- include all code in your deliverables, and
- for random number generation purposes, you use standard built-in methods to generate standard uniform samples. For generating samples from any other distribution, you'll have to construct them yourself using the standard uniform samples.

You are expected to submit the homework individually. Please compile answers and code in a single PDF document, and send it by e-mail to Nikki Levering (nikki.levering 'at' student.uva...).

Should you have any questions about the homework exercises, please reach out to one of the lecturers during the lecture, or to Nikki via e-mail.

Exercise 1 Make exercise III.1.1 of [AG].

Exercise 2 Example III.1.2 of [AG] contains errors. Identify them, and then make exercise III.1.2 of [AG].

Exercise 3 Make exercise III.1.3 of [AG]. You may assume Z' and Z'' to be independent.

Exercise 4 Make exercise III.3.1 of [AG]. Read s^2 as the sample variance, just like $\hat{z}$ represents the sample mean.

Exercise 5 Consider the second discrete-event simulation example that was discussed in the third lecture (i.e. the bank example or the M/G/c queueing model). However, we now let go of the assumption that the bank is open for 7 hours, but instead we assume that the bank is open 24 hours a day, 7 days a week. We are interested in the average queue length in the long run of this model.

- Discuss how the regenerative method can be applied and the simulation program can be adapted so as to obtain a 95% confidence interval for the average queue length.
- Discuss how the method of batch means can be applied and the simulation program can be adapted so as to obtain a 95% confidence interval for the average queue length.
- Implement any of these two methods in the simulation program, and present the confidence interval obtained.