A project on the Lookback put option with floating strike

The Loockback put option with floating strike and maturity T is the European style derivative with pay-off

$$Y = \max_{t\in[0,T]} S(t) - S(T)$$

The main goal of this project is to perform a parameter sensitivity analysis of the Loockback put option with floating strike using the finite version of the Monte Carlo method described in Section 3.3 of the lecture notes. The specific goals of the project are the following.

- Study numerically how the average price and the standard error of the mean computed with $n = 50$ trials depend on the number of paths M used in the computation (see Section 3.3 of the lecture notes for an example of this analysis in the case of the Asian option).

- Study numerically how the value of the Loockback put option at time $t = 0$ depends on the parameters $p, \alpha, \sigma, r, T, S_0$. Choose $N = 100$ and M at least 10^5 (possibly 10^6 if the calculations don't take too long). Is the found behaviour what you expected or the result of too large computational errors?

- Using the previous results, explain the main differences between the European put and the Lookback put with floating strike, e.g., by showing the price curves of both derivatives in the same plot (for the European put you do not need to use the Monte Carlo method, you can use the code in the lectures notes).

The results of the project have to be outlined in a report consisting of four sections:

- The first section is the Introduction (1-2 pages). Here is where you state the problem, describe the theoretical framework and discuss the financial applications. You can find plenty of information online, but *remember to cite your sources!*

- The second section is where you report and discuss your results (3-4 pages).

- The third section is the Conclusion. Summarize your most interesting results in this section and comment on possible flaws in your analysis (1 page).

- An appendix where you attach and explain the Matlab codes. The explanation of the codes could appear as comments within the codes themselves.

Remarks:

- The projects can be worked out in groups of max 4 students
- The report has to be submitted in PDF form by e-mail to calogero@chalmers.se. Use OPTIONS 2021 as subject and include all members of the group as recipients.
- Together with the report you have to submit a statement, signed by all members of the group, certifying that this report is your own work and that all members of the group have equally contributed to the assignment. All reports will be subjected to a plagiarism check. Information on how to avoid plagiarism and on Chalmers policy on plagiarism can be found on this link:

  `https://student.portal.chalmers.se/en/chalmersstudies/policy-documents/Pages/Academic-integrity-honesty.aspx`

- The deadline for submission is **January 3rd, 2021 at 23.59**. The grade on the project (max 2 points) will be communicated on January 7th.
- The grade of the project is mostly based on the "aesthetical" quality of the report, e.g., on having nice and informative plots (remember to specify labels for the axes). An incorrect interpretation of the results will not affect the grade, so be bold in your arguments!