A screenshot of a cell phone

Description automatically generated

1. Yes I compiled and run the code successfully.
2. Batch 1: As I’ve run multiple combinations of NT and NSIM, we can observe that in general, the higher both values, the closer we will get to the exact solution. As shown in the chart, when our NT is 100, which is rather small, if we have sufficiently large NSIM (typically more than 10,000, we will get a close enough approximation to the exact result, which the accuracy is two places behind the decimal point. However, it is important to note that simply increasing the NSIM size will not necessarily lead to a more accurate result. If we see the chart, we will notice that when we have 100 NT, 30,000 NSIM does not improve noticeably than 10,000 NSIM. This applies to NT as well, where when we fixed NSIM to 10,000, 1000 NT only improved a little comparing to 100 NT.

Batch 2: My conclusion based on observing Batch 2 does not vary much from Batch 1. In general we need at least one large number in between either NSIM or NT, or both numbers are large, to get close enough to the exact value. However, simply increasing the number may not guarantee a more accurate result. In fact, it may even have a negative effect because Monte Carlo does not always work, or, does not always converge to the exact solution. This means Monte Carlo method may be lack of predictable accuracy, where it requires a lot of trials to determine which set of parameters work best for different specific problems. I would say in general, Monte Carlo is a good method when we do not have the exact solution, since it can be applied to a wide range of problems, and can give reasonable results which will not deviate much from the exact solution, if we chose the right parameters.

1. Batch 4: I observed that in this batch, it becomes harder to converge to the exact result. As always, when we increase both NT and NSIM, the approximation will move toward to the exact solution, but there is also a limit. As shown in the chart, we tried NT = 1000 and NSIM = 1000,000, which in my opinion are already large values, and took a long time to run. The result is still not accurate enough to two places after the decimal for Call Value. Put Value performed better than Call Value in general, where we indeed match the digits before the two decimals. I think if we keep increasing NSIM or NT, the result may not vary much. This may be due to the limitation of Monte Carlo Method, where its applicability breaks down at some certain stage.