1. Introduction to your problem and objective.

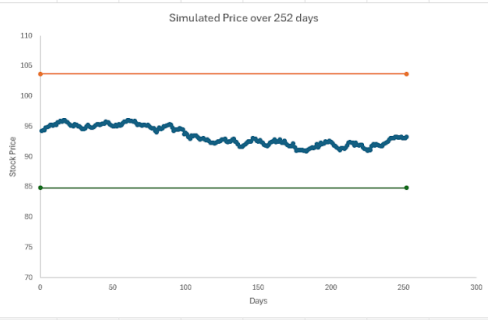
In this project, we try to figure out if investing in NVIDIA this upcoming year is a good decision by simulating future stock growth projections. NVIDIA stock prices are hard to predict due to constant fluctuations. We are looking to simulate and predict future prices for investors and financial analysts.

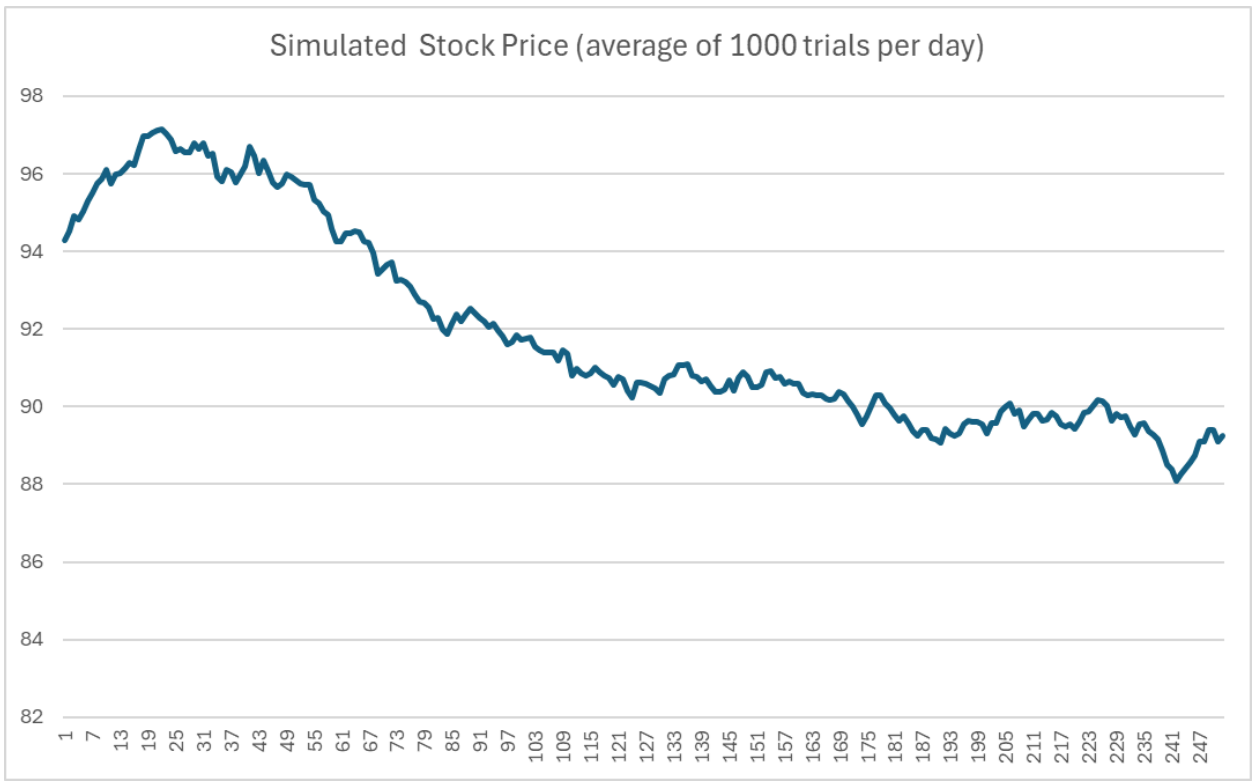
2. Input Variable and Data Distribution Do your research and identify input variables to help you with your simulation. Determine the distribution curves (uniform, normal, lognormal, etc.) you can use to set up your Monte Carlo simulation. Explain your reasons.

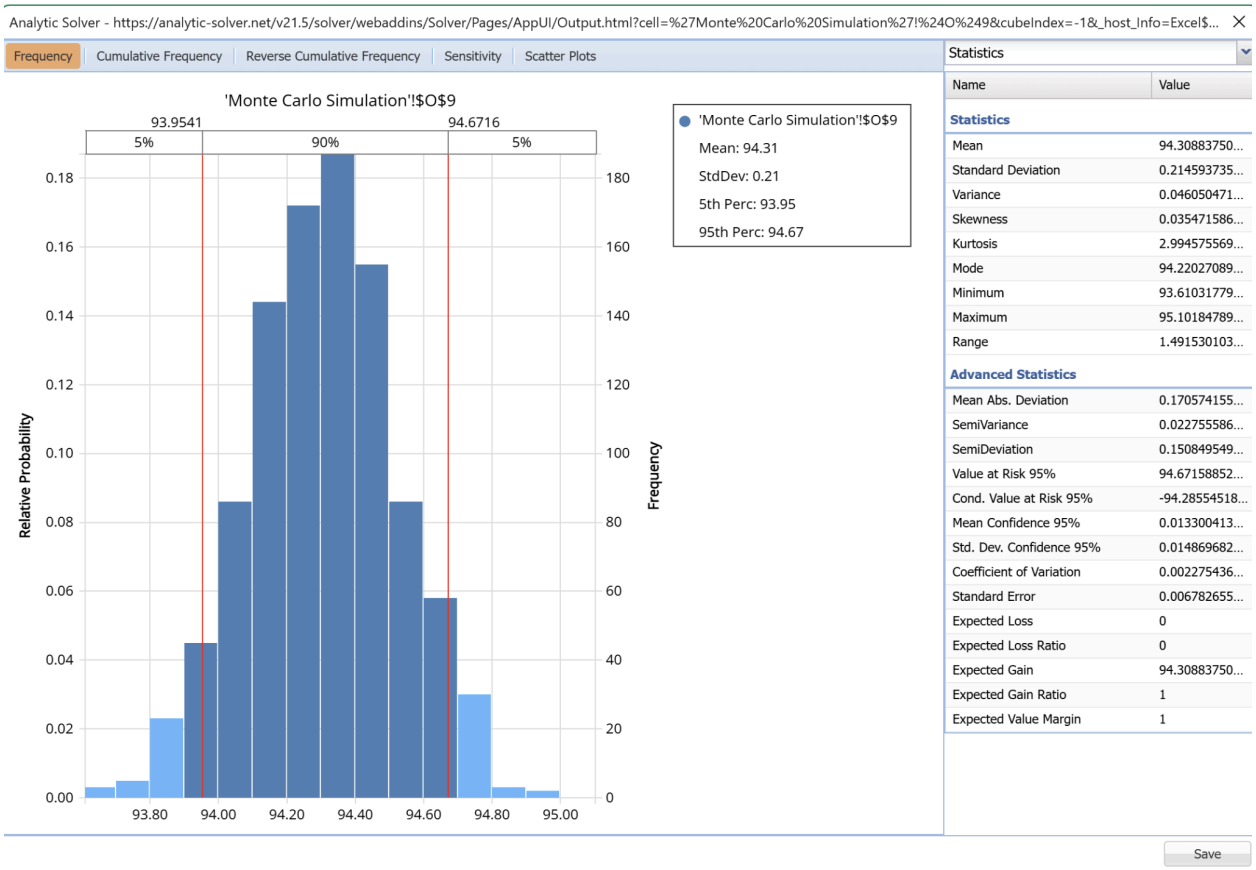
The Geometric Brownian Motion is the most common random model used for simulating and predicting stock prices. The Geometric Brownian Motion assumes that stock prices follow a log-normal distribution which means that the prices can not be negative and the price of the stock can fluctuate randomly but with a predictable trend based on constant drift and volatility. The Monte Carlo simulation will then run a large amount of simulations using repeated random sampling. We took a year's worth of NVIDIA stock history data (252 days) as our initial data set. Due to GBM, we need to calculate logarithmic returns to calculate our inputs. Log return is a way to measure the percent change in the price of a stock. It is calculated by taking the natural logarithm of the quotient, which is calculated by dividing the current day's closing price by the day before. We chose to take this because log returns match the assumption of our returns being normally distributed. Our inputs used to set up our Monte Carlo simulation are initial closing stock price, drift (μ) which is the average return calculated from historical log returns, volatility (σ) which is the standard deviation of the returns and measures how much the stock price fluctuates, and Delta (Δt**)** which is the time step is the small interval of time over which the stock price is updated in the simulation. This prevents the simulation from simulating one day 252 times as opposed to 252 different days.

3. Develop First Simulation and N Iterations Implement your problem and solve it either using Excel functions, Analytic Solver Platform or etc.

	A	B	C	D	E	F
1	Starting Price	85.91				
2	Drift (μ)	0.000371661				
3	Volatility (σ)	0.036409615				
4	Total trading days	252				
5	Delta(Δ)	0.003968254				
6	Price of the previous day	94.31				
7						
8		days (trials of 1 year)	simulated price	Increase or Decrease from the previous day		
9		1	94.33863793	TRUE		
10		2	94.39729045	TRUE	Mean of the year	93.42115861
11		3	94.37953163	FALSE	Standard Deviation	1.533005144
12		4	94.84726934	TRUE		
13		5	94.97921105	TRUE		
14		6	95.01020286	TRUE		
15		7	95.23934224	TRUE		
16		8	95.27326585	TRUE		
17		9	95.20140629	FALSE		
18		10	95.41441678	TRUE		
19		11	95.31970559	FALSE		
20		12	95.72387575	TRUE		
21		13	95.66862366	FALSE		
22		14	95.88536569	TRUE		
23		15	95.83663119	FALSE		
24		16	96.05329202	TRUE		
25		17	96.03074659	FALSE		
26		18	95.81173694	FALSE		
27		19	95.70111272	FALSE		
28		20	95.35702634	FALSE		
29		21	95.1850686	FALSE		
30		22	95.21607163	TRUE		
31		23	95.08528153	FALSE		
32		24	95.34079694	TRUE		
33		25	95.28071753	FALSE		
34		26	95.09033745	FALSE		
35		27	95.07685943	FALSE		







4. Phase 4: Summary Statistics Explain your findings and results

We ran two simulations. One using an analytic solver and one manually through excel. After running the simulation through analytic solver, we are able to see a downwards trend in the average stock price for NVIDIA. For our distribution, we are only able to create one for each day and not a distribution for the entire year. For the first day, our distribution shows a 94.31 mean for stock price. Based on our value at risk, there is a 95% chance that the stock price will not go above 94.67 for the next day. The worst 5% of possible outcomes, those beyond the VaR, the average loss would be 94.29, indicated by the conditional value at risk. Our single simulation not using analytic solver also shows that the stock price trends downwards but stabilizes near the original price towards the end. Overall, based on our simulation, we should not invest in NVIDIA as the return is not worth the risk.

5. Additional Feature Conduct your own research and identify two additional features to add to your implementation. The additional feature should be something that was not explicitly asked in the questions.

The first feature we added to our implementation is conditional formatting. In our simulation, whenever the generated stock price increased from the previous day, the cell will be highlighted green. If the generated stock price decreased from the previous day, the cell will be highlighted red.

The second feature is another visualization feature where we added two lines on our graph representing profit and loss thresholds. The lines show whether at any time our stock price increases by 10% which is $103.74 or decreases to $84.88.

6. Describe how Monte Carlo Simulation helped your project to make better decisions.

Monte Carlo simulation helped us make better decisions regarding stock prices by generating multiple possible scenarios regarding the NVIDIA stock price. By doing so, we are able to quantify and visualize the risk and make a data-driven decision or prediction. With a graphic and distribution visualization, we can assess even further through trends and confidence intervals. We are also able to see how the mean and standard deviation, or in this case the drift and volatility, affect the stock price.

7. Explain drawbacks/disadvantages of implementing Monte Carlo in your scenario.

The drawback of implementing the Monte Carlo simulation is that it does not capture the full picture. The simulations are completely dependent on the historical data we provide and the variables were estimated from this data meaning it may not accurately reflect market behavior. Due to the model following the GBM, it makes it even less reliable when it comes to capturing

real market dynamics. Finally, the Monte Carlo simulation is unable to take into account real-world events. For example, while doing this project, there was a huge stock market crash due to newly implemented tariffs. Due to this new policy, NVIDIA experienced a large crash in a short period of time. The simulation has no way of predicting these sorts of events along with changing economic conditions.