MFE405 Project 4

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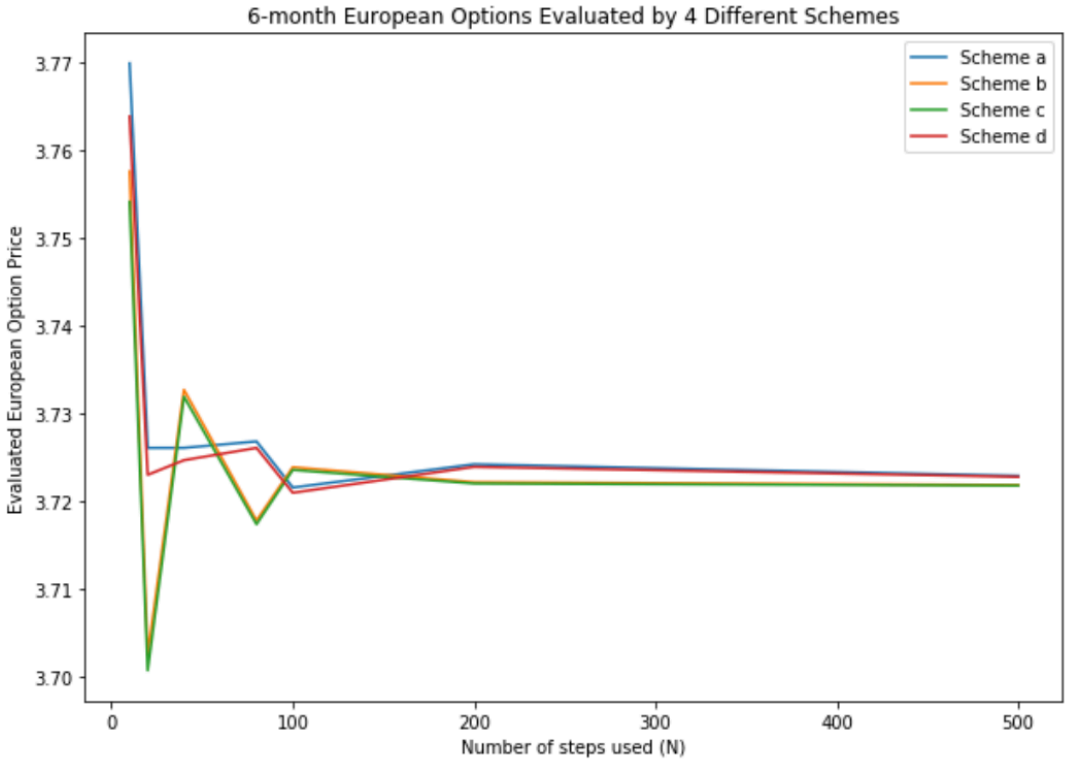
Problem 1.



Problem 2.

(a)

The estimated price of AMZN call option that expires in January of next year (1/15/2020) is $ 157.14.

The market price of the call option is $231.75.

The two prices are not close. The reason of this discrepancy is probably that the errors incurred in the estimation of annualized historical volatility. The historical volatility has very little predicting power on the future volatility of AMZN returns. Therefore it should not be used to calculate in the call option price.

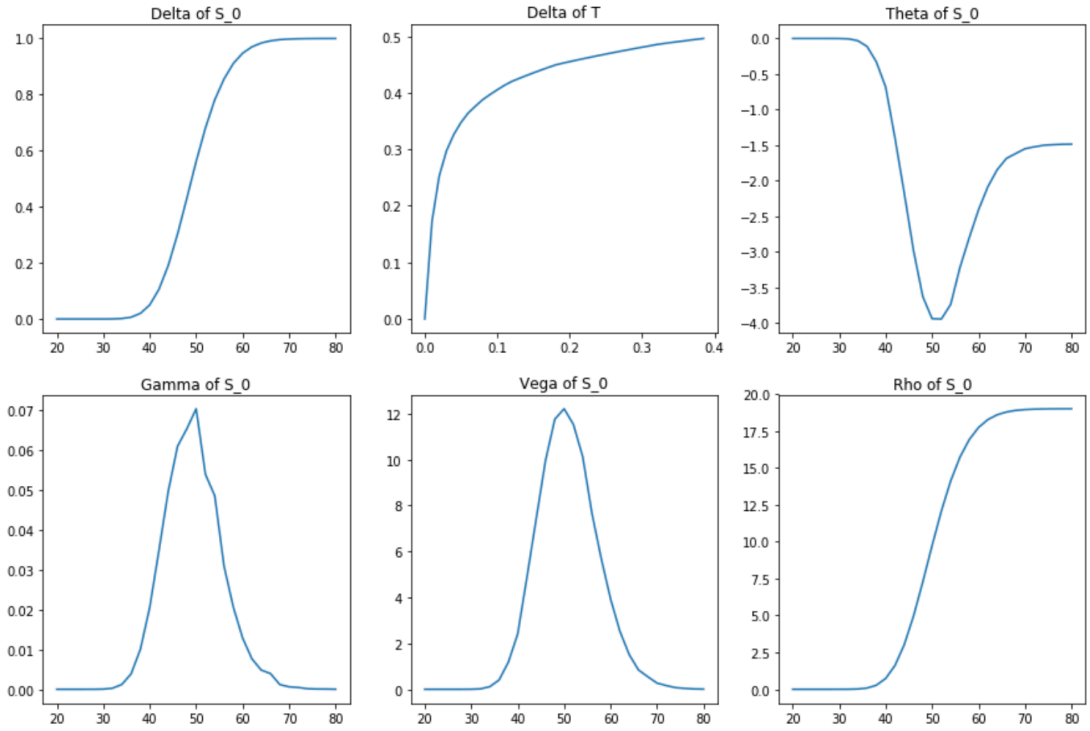
(b)

I applied Newton's method to find the implied volatility with tolerance of 10^- 6, and the historical volatility as the initial guess.

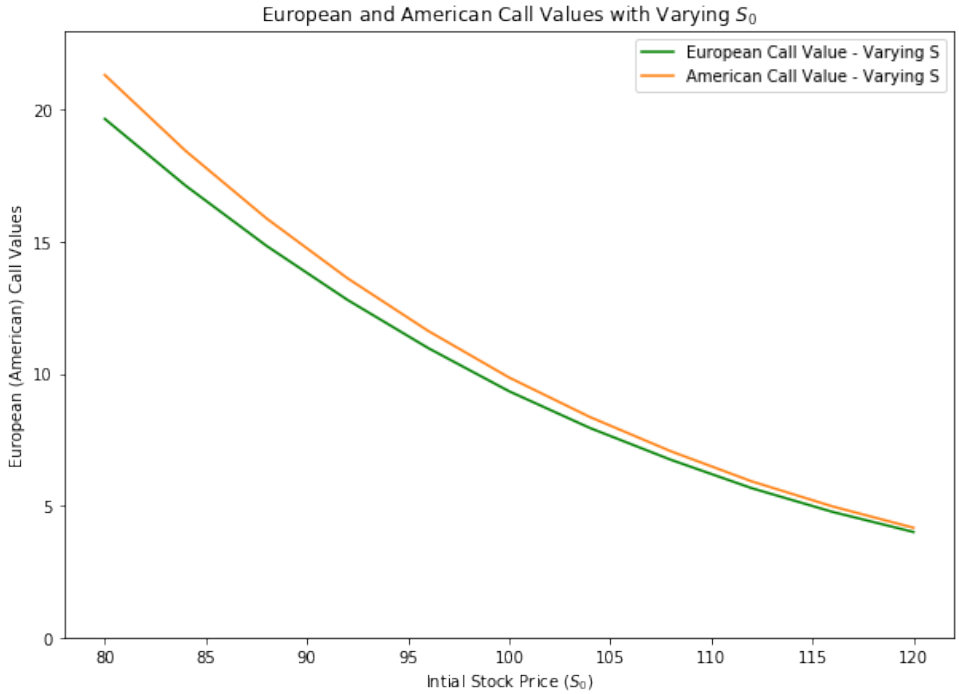
The annualized volatility calculated using 60-month historical daily return is 0.2959

The implied volatility under the price is 0.392 which would make my estimated price equal to the market price

Problem 3.



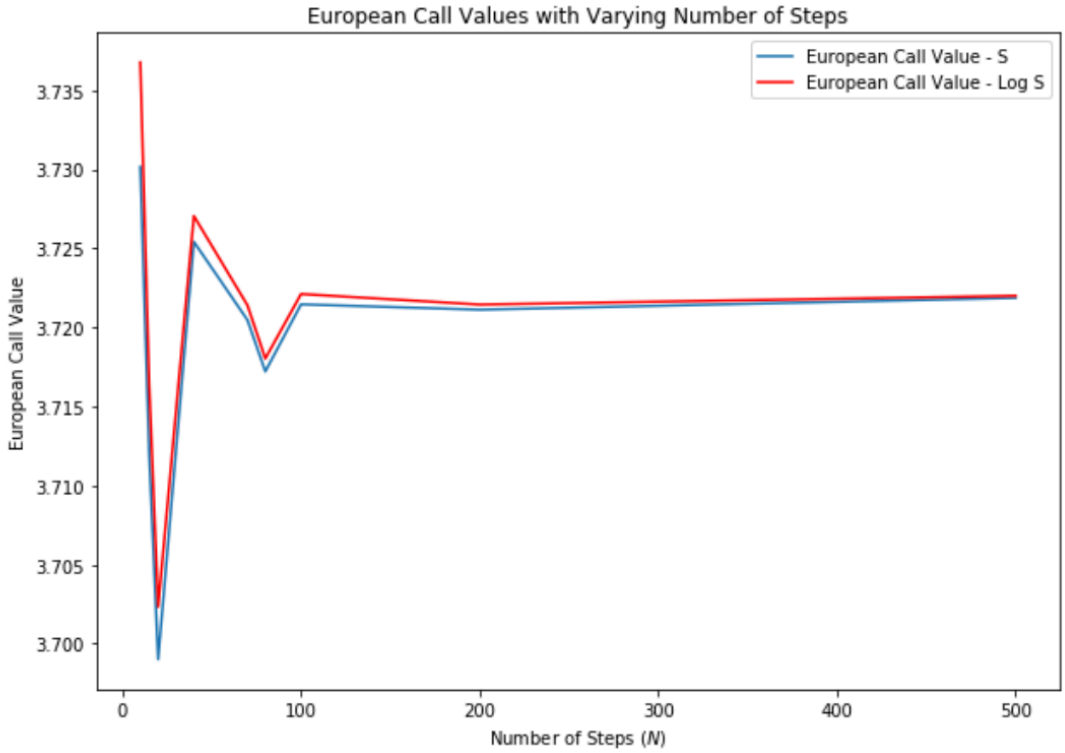
Problem 4.



Comment:

The graph clearly shows that the put option price on current stock price is a convex function as it should be. The American put option prices are higher than European put option as it should be because the right to early exercise is embedded. As the S0 increases, the prices of American Call and European Call will converge.

Problem 5.



Problem 6.

The call option price is $3.725469.