

MFE405 Project 3

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Problem 1.

$$P(Y_2 > 5) = 0.978$$

$$e_1 = 0.6517$$

$$e_2 = 26.0594$$

$$e_3 = 4.0181$$

Problem 2.

$$e_1 = 1.3357$$

$$e_2 = 1.6801$$

Problem 3.

(a)

When $S_0=15$, $\sigma=0.25$, $T=0.5$, $X=20$, $r=0.04$, $dt=0.004$:

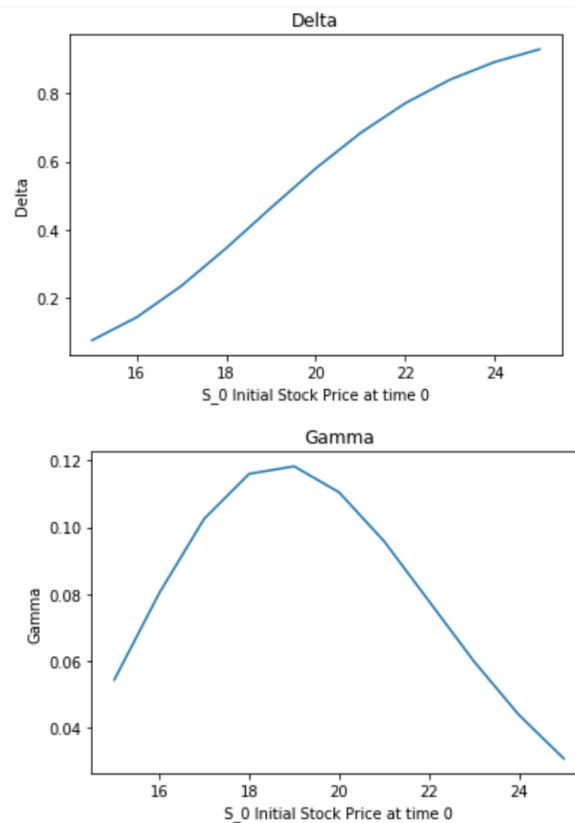
$$C_1 = 0.08694684209995243$$

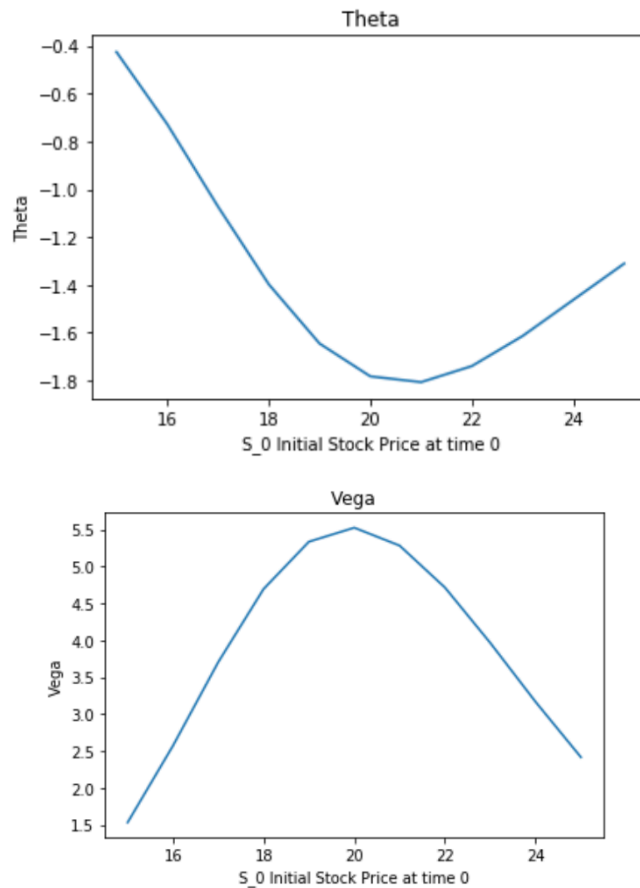
(b)

When $S_0=15$, $\sigma=0.25$, $T=0.5$, $X=20$, $r=0.04$:

$$C_2 = 0.08575224964083072$$

(c)





Problem 4.

Full Truncation Method: 13.27715207040817

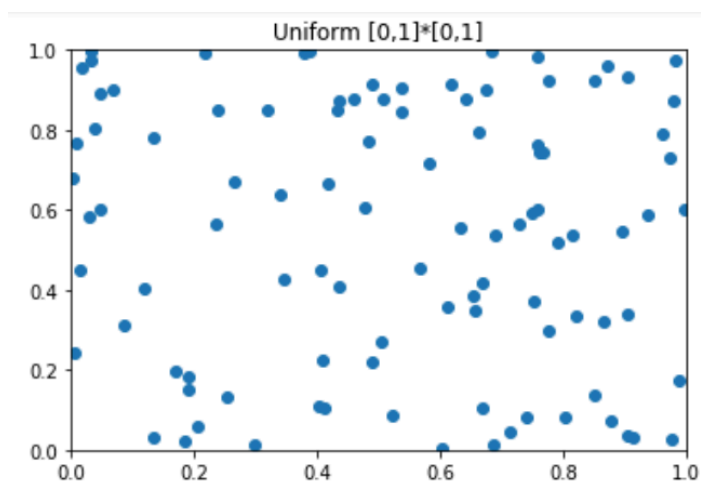
Partial Truncation Method: 12.482376237441935

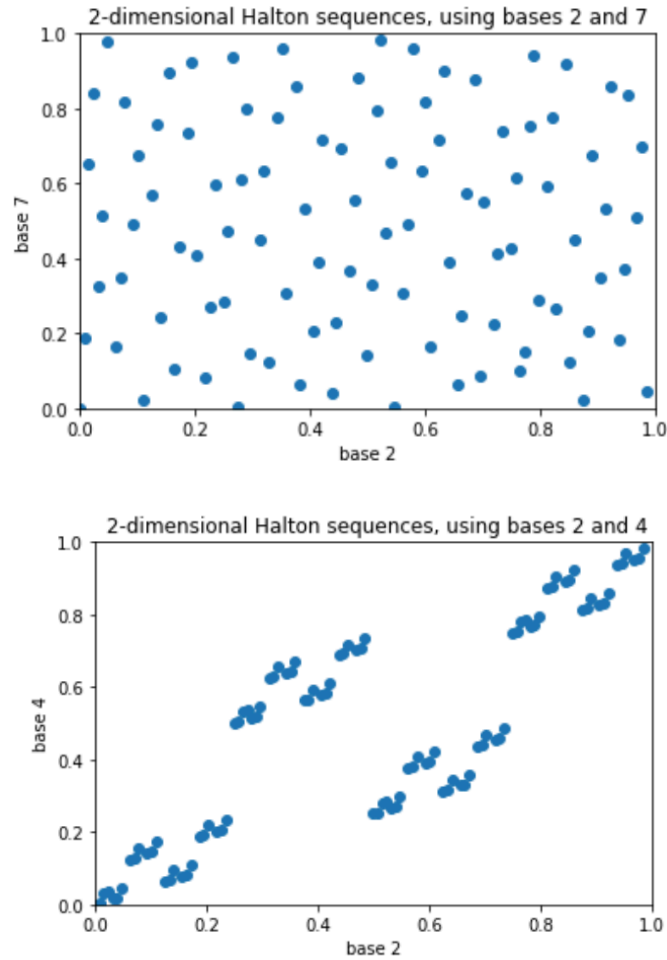
Reflection Method: 12.337691568518215

Problem 5.

(a) I use LGM method.

(d)





From the graphs above, we can tell the 2-dimensional uniform vector generated by LGM seems to distribute evenly and randomly. The 2-dimensional Halton sequences using bases 2 and 7 also perform as if they are evenly and randomly distributed. However, the 2-dimensional Halton sequences using bases 2 and 4 shows strong correlation between x dimension and y dimension since 4 is not a prime number. Hence, it does not resemble the i.i.d uniform property in 2-dimension well. The 2d Halton sequence with base 2 and 4 should not be used to approximate any integrals as we calculate below which is a negative number.

(e)

The estimates of I using bases (2,4), (2,7), (5,7) are respectively:

-0.004944443218352656

0.026249038194260624

0.02635889282500275