MA 374 Lab 01

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1. Tabulation of option prices for different subintervals

Call Price
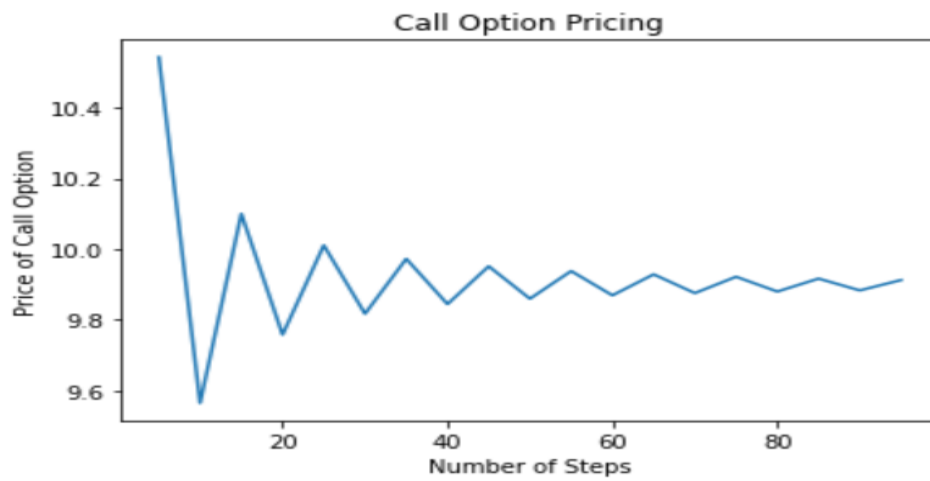
Step Size	Option Price
1	12.7881
5	10.543
10	9.56541
20	9.75852
50	9.86016
100	9.88602
200	9.89397
400	9.89443

Put Price

Step Size	Option Price
1	33.9091
5	31.664
10	30.6864
20	30.8795
50	30.9812
100	31.007
200	31.015
400	31.0154

2. **Comparison of option prices at t =0 for various values of M**
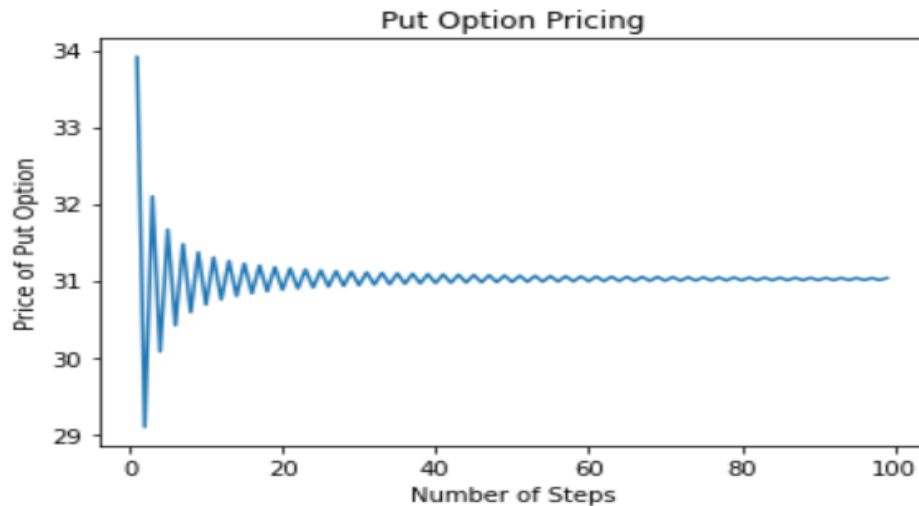
1.call option in step of 5

Call Option Pricing

2. Call option in step of 1

Call Option Pricing
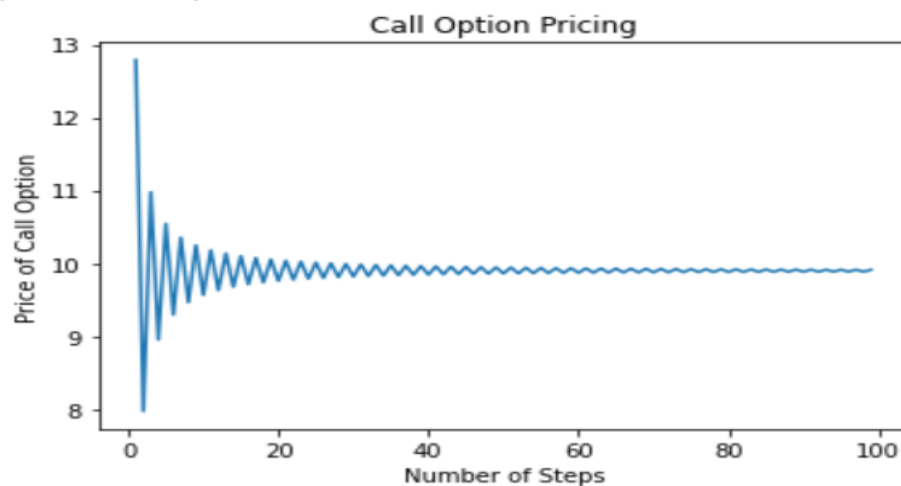
3. Put option in step of 5
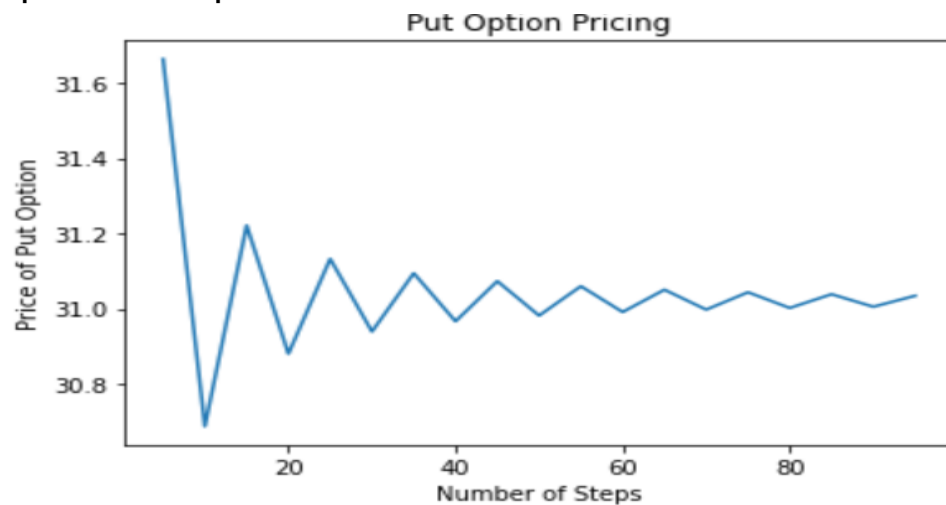
Put Option Pricing

4. Put option in step of 1

Put Option Pricing

Convergence : The Call Option pricing plot shows that the initial call option price converges to 9.894 and initial put option price converges to 31.015.

3. Values of call option at different times:

```
          Call Price
 Time Step  Option Price
----------  -------------------------------------------------------------------------
     0     [    9.75852346    14.88610343    22.25787025    32.59144692    46.70211743
            65.46524001    89.77319083   120.5086337    158.56219417   204.91431529
           260.77227626   327.71460288   407.78086345   503.49141479   617.86415262
           754.49866405   917.68834103  1112.55410209  1345.20388707  1622.92289232
          1954.40047112]
    0.5    [    0.            0.            3.83425002     6.27071757    10.04965485
            15.75788014    24.13631021    36.05990474    52.48324216    74.35780753
           102.55193478   137.83106071   180.95812985   232.91628128   295.13939458
           369.57316075   458.57375686   564.9515151    692.05845537   843.89268853
          1025.22294193]
     1     [    0.            0.            0.             0.             1.12570593
             2.00557112     3.50710315     6.00704053    10.05466473    16.40425863
            26.01554412    39.99302986    59.44491009    85.28780021   118.11401092
           158.32156551   206.60633076   264.4208434    333.6046424    416.35184781
           515.27950191]
    1.5    [0.00000000e+00 0.00000000e+00 0.00000000e+00 0.00000000e+00
           0.00000000e+00 0.00000000e+00 2.06440194e-01 4.08454270e-01
           7.96626064e-01 1.52838370e+00 2.87733698e+00 5.29909114e+00
           9.51113955e+00 1.65607130e+01 2.78165619e+01 4.47763068e+01
           6.85945278e+01 9.94861138e+01 1.36881019e+02 1.81712460e+02
           2.35416608e+02]
     3     [0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.]
    4.5    [0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.]
```

Values of put option at different times:

```
          Put Price
 Time Step  Option Price
----------  -------------------------------------------------------------------------
```

```
0    [3.08795397e+01 2.53456692e+01 1.98158294e+01 1.45735531e+01
      9.91634001e+00 6.10193862e+00 3.28604948e+00 1.47264631e+00
      5.04278359e-01 1.11278883e-01 9.84430573e-03 0.00000000e+00
      0.00000000e+00 0.00000000e+00 0.00000000e+00 0.00000000e+00
      0.00000000e+00 0.00000000e+00 0.00000000e+00 0.00000000e+00
      0.00000000e+00]
0.5  [0.00000000e+00 0.00000000e+00 4.03235583e+01 3.46876534e+01
      2.86483800e+01 2.24536802e+01 1.64402508e+01 1.10008935e+01
      6.51506827e+00 3.24826457e+00 1.25057290e+00 3.11449456e-01
      2.97190058e-02 0.00000000e+00 0.00000000e+00 0.00000000e+00
      0.00000000e+00 0.00000000e+00 0.00000000e+00 0.00000000e+00
      0.00000000e+00]
1    [ 0.          0.          0.          0.         50.12009055 44.95537469
     39.05250639 32.52368732 25.6026455  18.66726056 12.228273    6.85464314
      3.01576492  0.86630065  0.0897188   0.          0.          0.
      0.          0.          0.        ]
1.5  [ 0.          0.          0.          0.          0.          0.
     59.48326128 55.23042233 50.10538831 44.05909203 37.11881719 29.44633504
     21.40864006 13.6348775   6.99509898  2.39207487  0.27085237  0.
      0.          0.          0.        ]
3    [ 0.          0.          0.          0.          0.          0.
      0.          0.          0.          0.          0.          0.
     81.26986748 79.81709829 77.86902987 75.32749202 72.07535953 67.97289839
     62.8534079  56.51802271 48.72951312]
4.5  [ 0.          0.          0.          0.          0.          0.
      0.          0.          0.          0.          0.          0.
      0.          0.          0.          0.          0.          0.
```
95.86928658 95.89725656 95.69855108]