

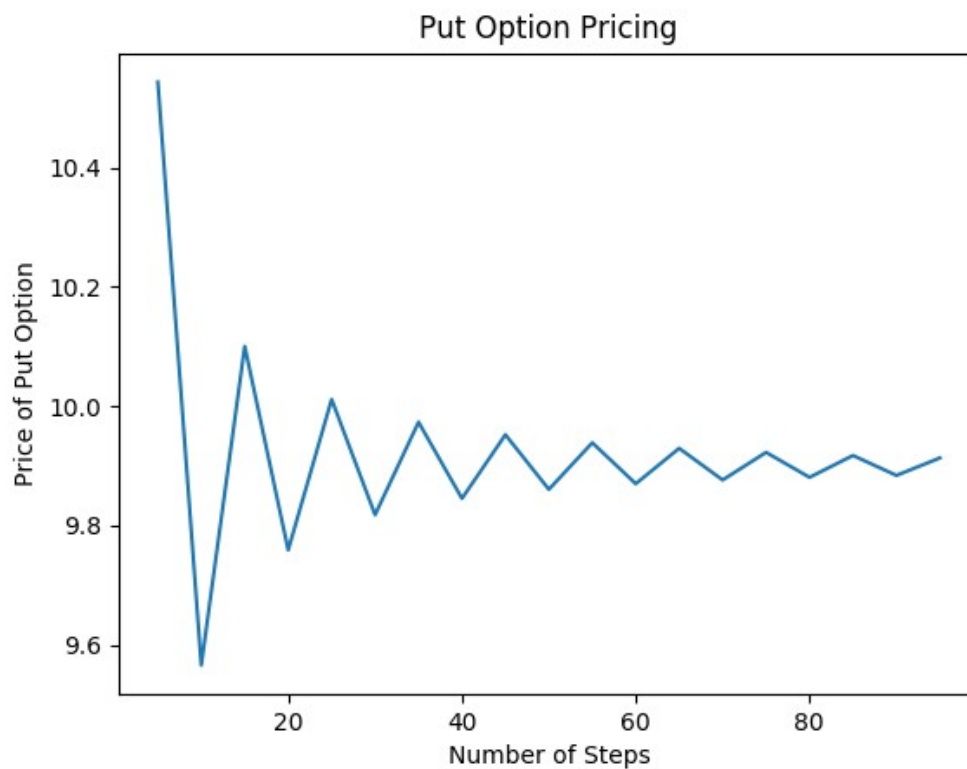
MA 374 Lab 01

1. Tabulation of initial prices of Options :

| Put 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 |

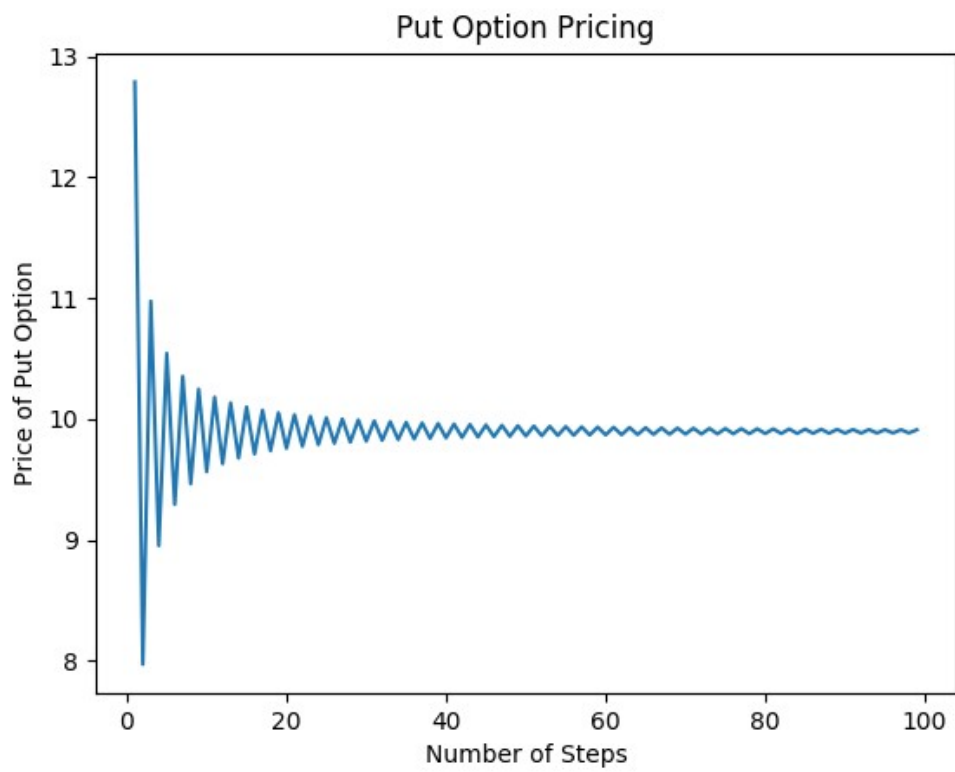
| Call Price | |
|------------|--------------|
| Step Size | Option Price |
| 1 | 33.9091 |
| 5 | 31.664 |
| 10 | 30.6864 |
| 20 | 30.8795 |
| 50 | 30.9812 |
| 100 | 31.007 |
| 200 | 31.015 |
| 400 | 31.0154 |

2. Plots

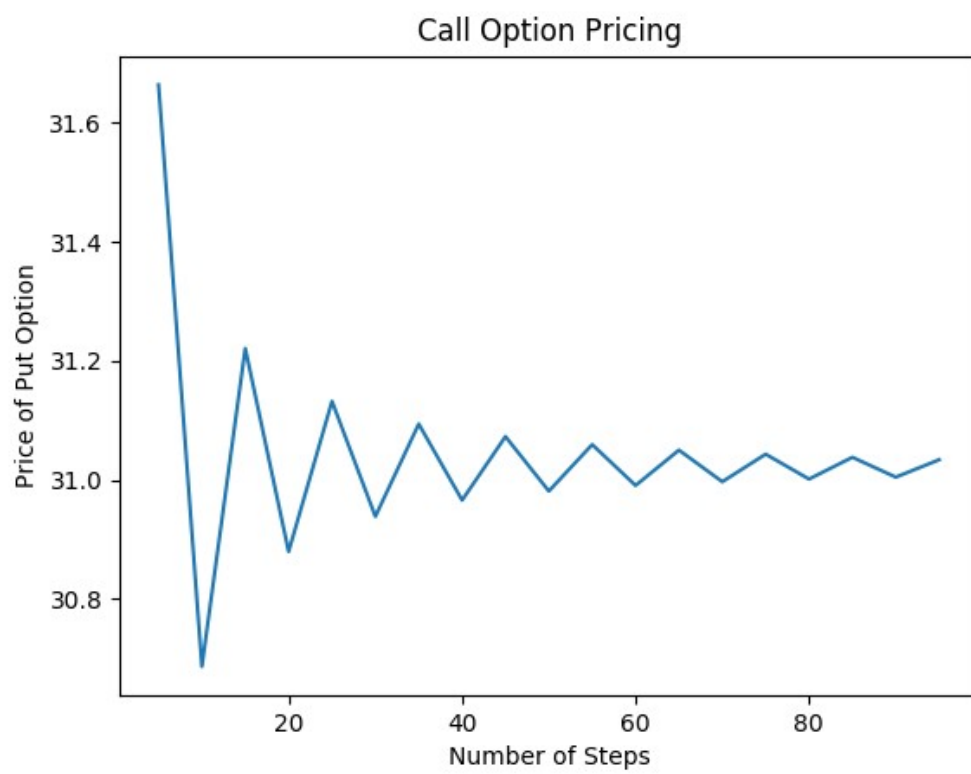


Step Size = 5

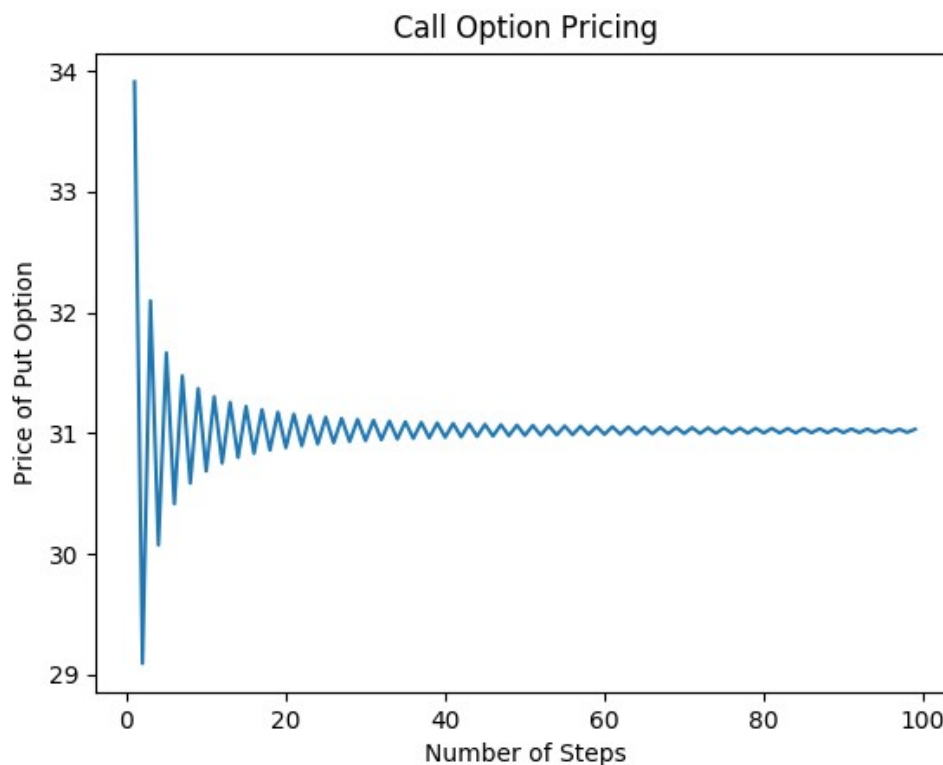
Step Size = 1



Step size = 5



Step size = 1



Convergence :

The Put Option pricing plot shows that the initial put option price converges to **9.894** and initial call option price converges to **31.015**.

3. Values of Options at different time points:

| Put 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] |
| 0.50 | [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] |
| 1.50 | [0.00000000 0.00000000 0.00000000 0.00000000 |

0.00000000 0.00000000 2.06440194e-01 4.08454270e-01
7.96626064e-01 1.52838370 2.87733698 5.29909114
9.51113955 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.]
4.5 [0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.]

Call Price

| Step Size | Option Price |
|-----------|---|
| 0 | [3.08795397e+01 2.53456692e+01 1.98158294e+01 1.45735531e+01 9.91634001 6.10193862 3.28604948 1.47264631 5.04278359e-01 1.11278883e-01 9.84430573e-03 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000] |
| 0.50 | [0.00000000 0.00000000 4.03235583e+01 3.46876534e+01 2.86483800e+01 2.24536802e+01 1.64402508e+01 1.10008935e+01 6.51506827 3.24826457 1.25057290 3.11449456e-01 2.97190058e-02 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000] |
| 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] |
| 4.75 | [0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 95.86928658 95.89725656 95.69855108] |