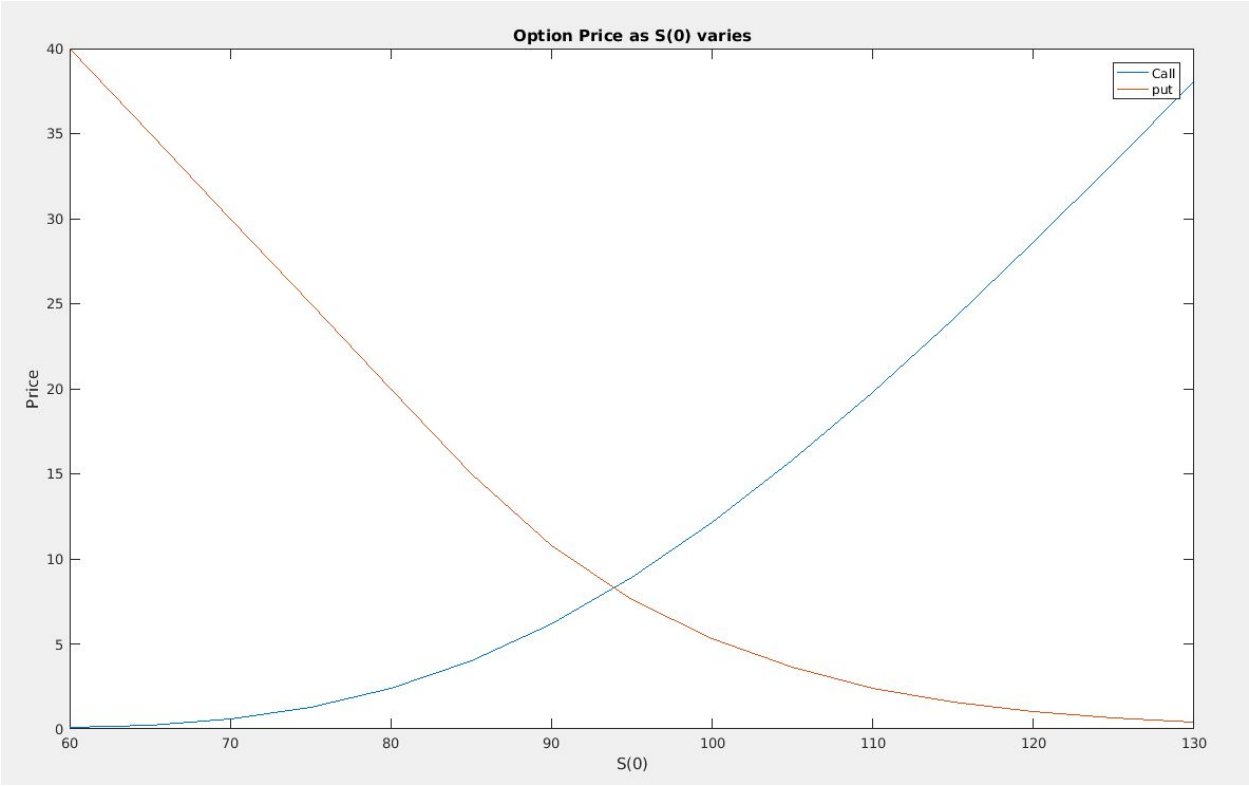
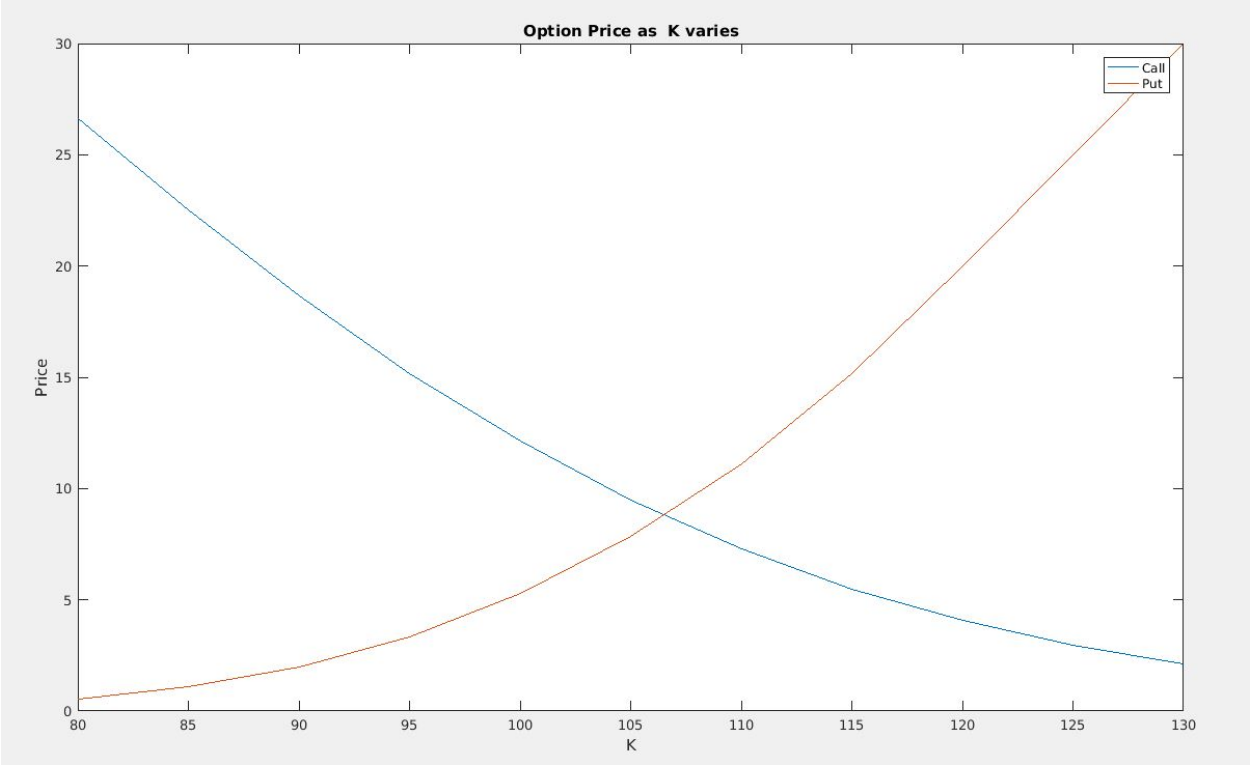
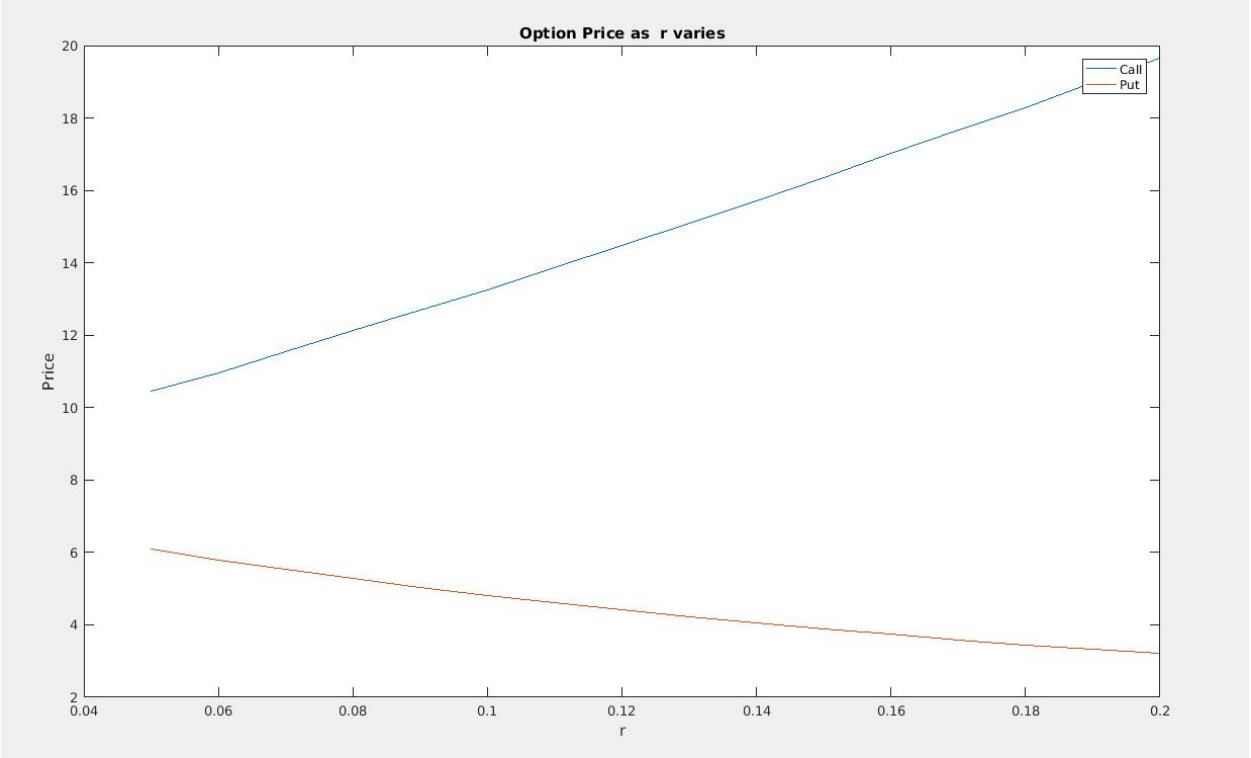
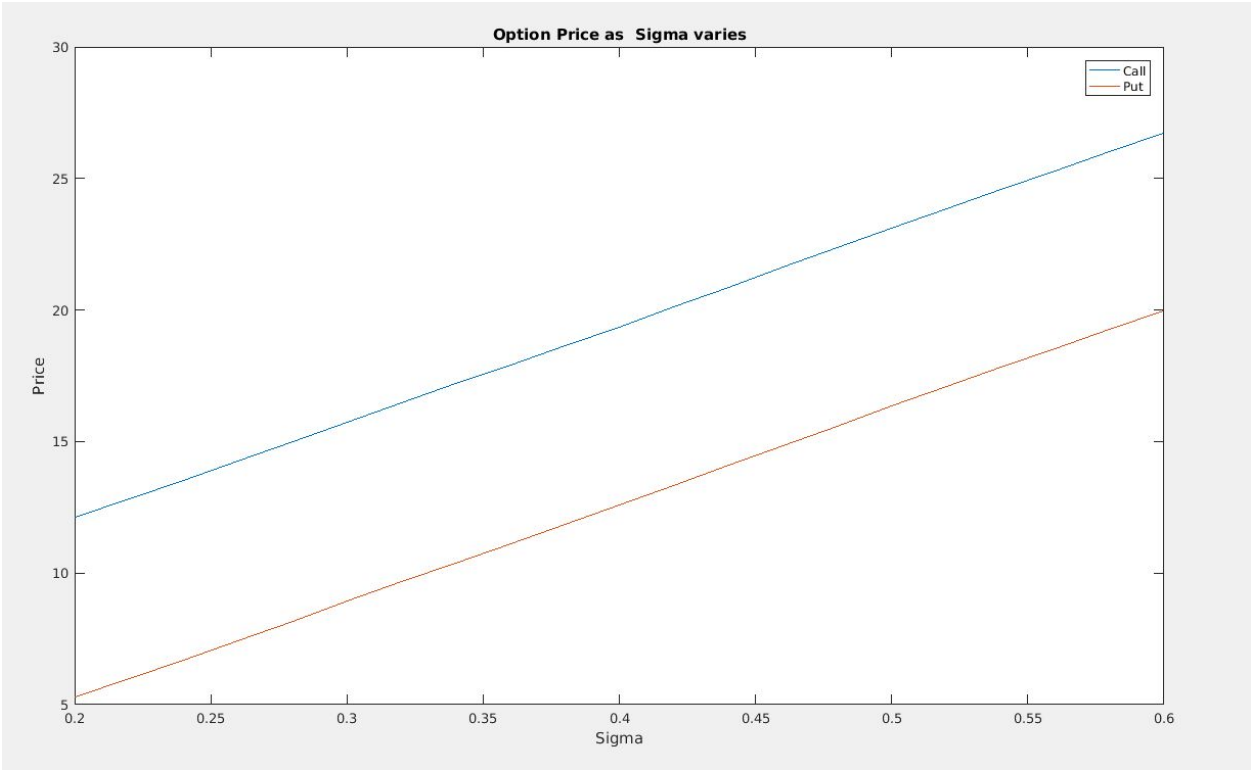
NIKHIL KOMMINENI **170123025** **LAB03**

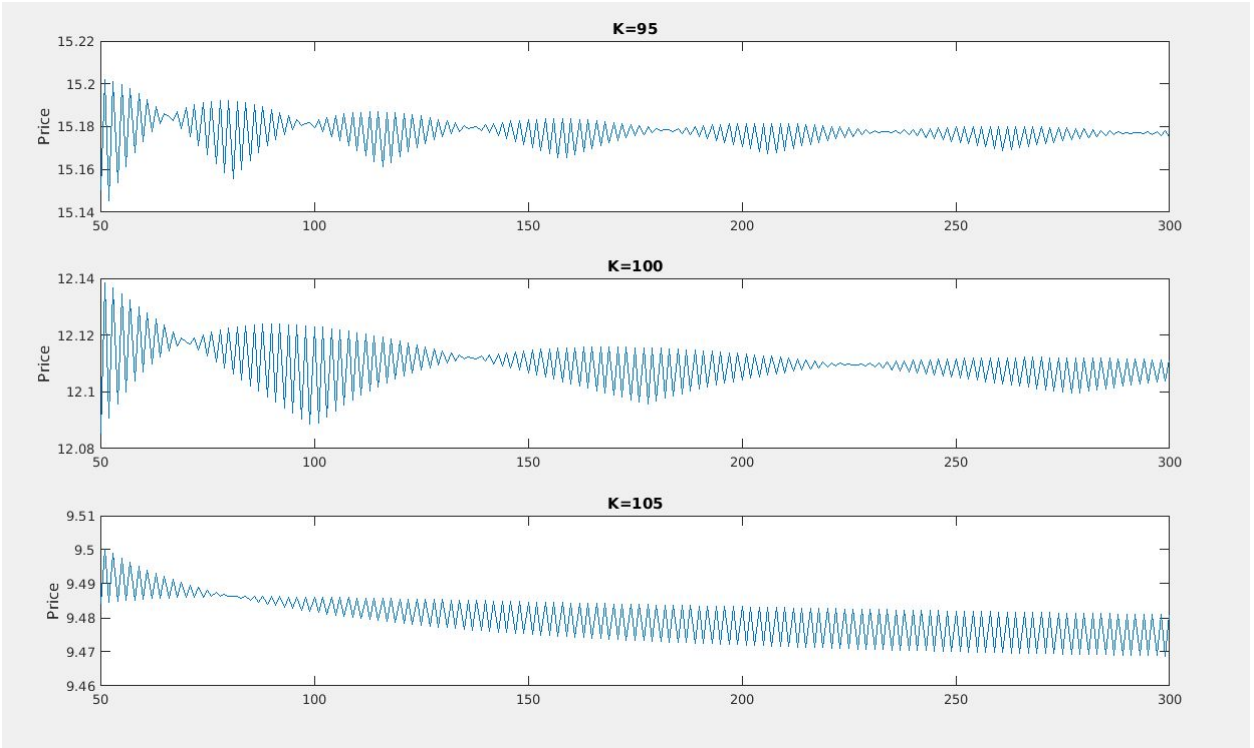
Problem 1:




Option Price as K varies
Call
Put
Price
K
0
5
10
15
20
25
30
80
85
90
95
100
105
110
115
120
125
130


Option Price as r varies
Call
Put
Price
r
2
4
6
8
10
12
14
16
18
20
0.04
0.06
0.08
0.1
0.12
0.14
0.16
0.18
0.2


Option Price as Sigma varies
Call
Put
Price
Sigma
30
25
20
15
10
5
0.2
0.25
0.3
0.35
0.4
0.45
0.5
0.55
0.6


K=95
Price
15.22
15.2
15.18
15.16
15.14
K=100
Price
12.14
12.12
12.1
12.08
K=105
Price
9.51
9.5
9.49
9.48
9.47
9.46
50
100
150
200
250
300

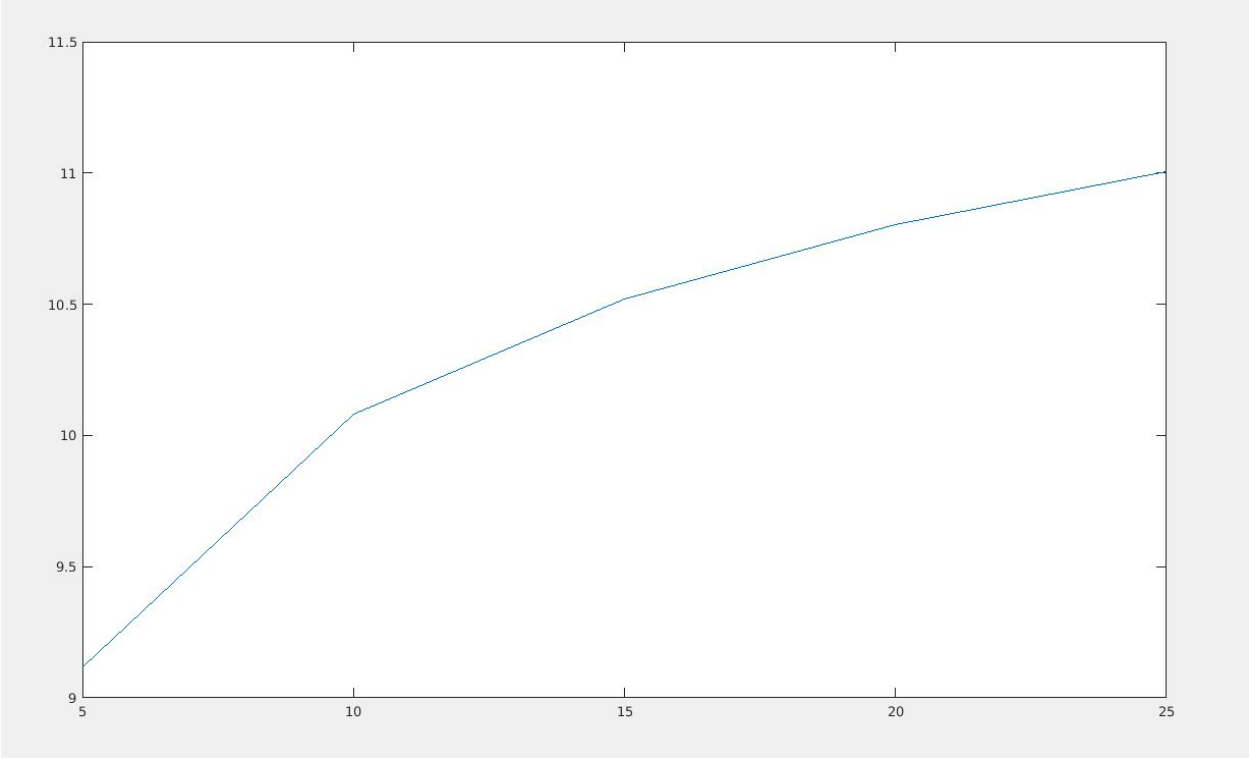
Problem 2:

For M = 5 the values at each intermediate level are
level 2 : 9.027951 9.504840
level 3 : 8.548076 9.799119 7.147916 12.168665
level 4 : 7.416771 9.955271 6.201916 13.712863 6.201916 8.324615 7.148418 17.582063
level 5 : 5.501639 9.571392 4.600480 15.631852 4.600480 8.003614 6.680843 21.188089 4.600480 8.003614 3.846929 13.071381 3.846929 10.680904 10.680904 25.051229

The initial price of the option for M = 5 is 9.119299
The initial price of the option for M = 10 is 10.080583
The initial price of the option for M = 15 is 10.519165
The initial price of the option for M = 20 is 10.805119
The initial price of the option for M = 25 is 11.003495

Time taken for M=5 is 0.007235 seconds.
Time taken for M=10 is 0.003591 seconds.
Time taken for M=15 is 0.033504 seconds.
Time taken for M=20 is 0.887279 seconds.
Time taken for M=25 is 28.601824 seconds.

This is the graph for M vs intial option price for look back option.



Problem 3:

Elapsed time is 0.003419 seconds.
For m=5 the price of the lookback option is 9.119299

Elapsed time is 0.002818 seconds.
For m=10 the price of the lookback option is 10.080583

Elapsed time is 0.041241 seconds.
For m=25 the price of the lookback option is 11.003495

Elapsed time is 0.643968 seconds.
For m=50 the price of the lookback option is 11.510862

Elapsed time is 13.448697 seconds.
For m=100 the price of the lookback option is 11.888705

Method	M=5	M=10	M=25
Not using Markov	0.007235s	0.003591s	28.601824s
Markov	0.003419s	0.002818s	0.041241s

There isn't much change for small values of M but changes significantly for large M.For M above 30 without using markov process takes so much time to complete whereas using markov for M=100 also it takes half the time when compared to M=25 in non markov process.

Problem 4:

For m=5 The price of the European Call by using Markov is 12.163186
For m=10 The price of the European Call by using Markov is 12.277328
For m=25 The price of the European Call by using Markov is 12.136746
For m=50 The price of the European Call by using Markov is 12.085362

The price of the European Call option for m=5 is 12.163186
The price of the European Call option for m=10 is 12.277328
The price of the European Call option for m=25 is 12.136746