Lab - 07

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Ques -1

The formula for price of European Call Option is: -

$$C(t,x) = xN(d_+(T-t,x)) - Ke^{-r(T-t)}N(d_-(T-t,x))$$

where,

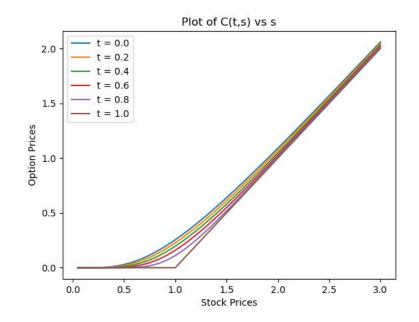
$$d_{\pm}(T-t,x) = \frac{1}{\sigma\sqrt{T-t}}[\log(x/K) + (r \pm \frac{\sigma^2}{2})(T-t)]$$

For the European Put Option, we use the put call parity which is given by: -

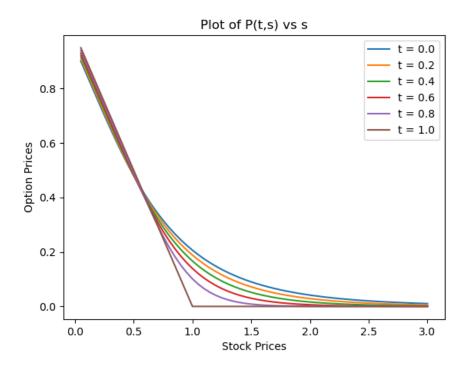
$$C(t,x) - P(t,x) = x - Ke^{-r(T-t)}$$

Ques - 2

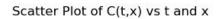
C(t,s) vs s for given time points: -

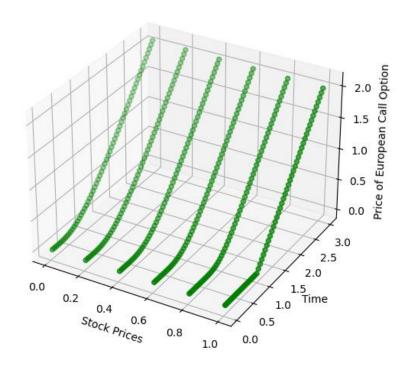


P(t,s) vs s for given time points: -



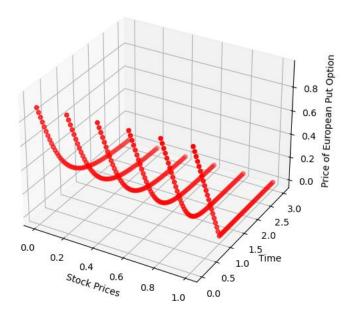
C(t,s) vs both t and s for given time points: -





P(t,s) vs both s and t for given time points: -

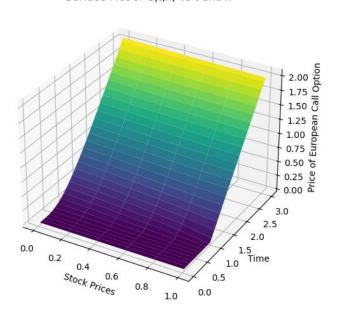
Scatter Plot of P(t,x) vs t and x



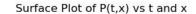
Ques - 3

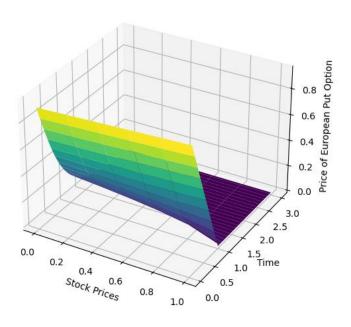
C(t,s) as a smooth surface: -

Surface Plot of C(t,x) vs t and x



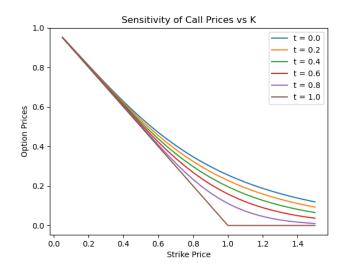
P(t,s) as a smooth surface: -

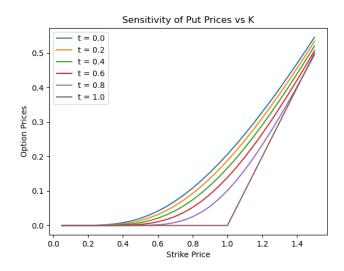


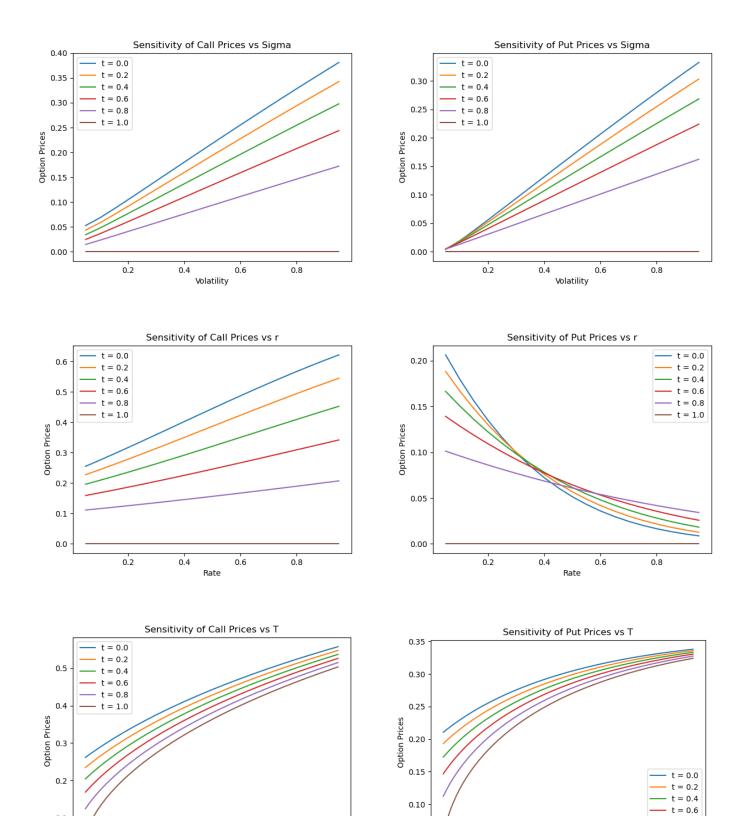


Ques - 4

The sensitivity of call and put prices with different factors one at a time can be visualized as follows: -







0.05

1.0

1.5

2.0

2.5

3.0

Expiry Time

3.5

4.0

t = 0.8 t = 1.0

5.0

4.5

0.1

1.0

1.5

2.0

2.5

3.0

Expiry Time

3.5

4.0

4.5

5.0

The sensitivity of call and put prices with different factors two at a time can be visualized as follows: -

0.8

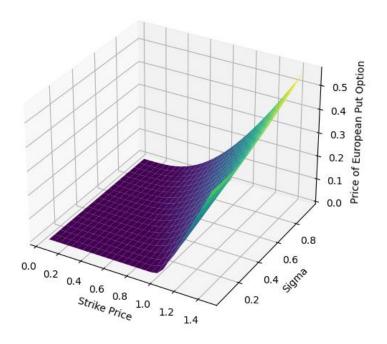
0.6

0.4 sigma

Surface Plot of Call Option Prices vs K and sigma

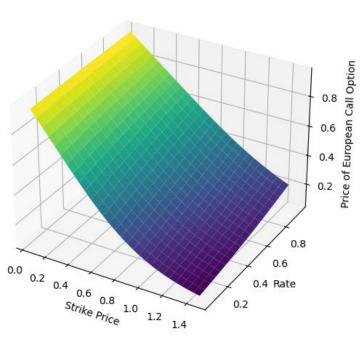
0.6 0.4 0.4 0.4 0.2 0.2 0.0 Enrobean Call Option

Surface Plot of Put Option Prices vs K and sigma

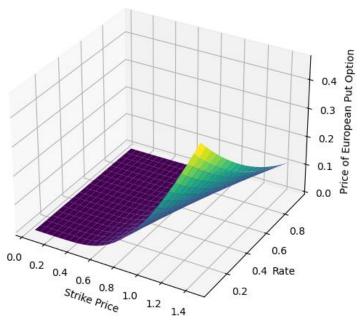


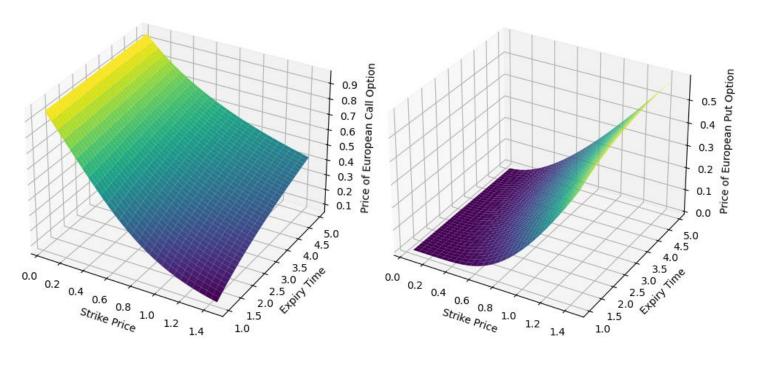
Surface Plot of Call Option Prices vs K and r

0.0 0.2 0.4 0.6 0.8 Strike Price 1.0 1.2 1.4



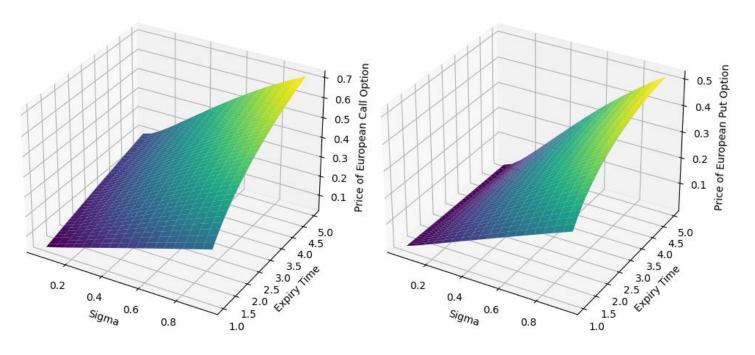
Surface Plot of Put Option Prices vs K and r

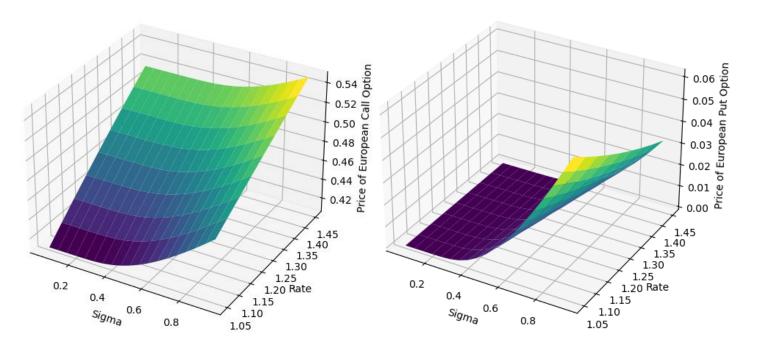




Surface Plot of Call Option Prices vs sig and T

Surface Plot of Put Option Prices vs sig and T





Surface Plot of Call Option Prices vs T and r

Surface Plot of Put Option Prices vs T and r

