

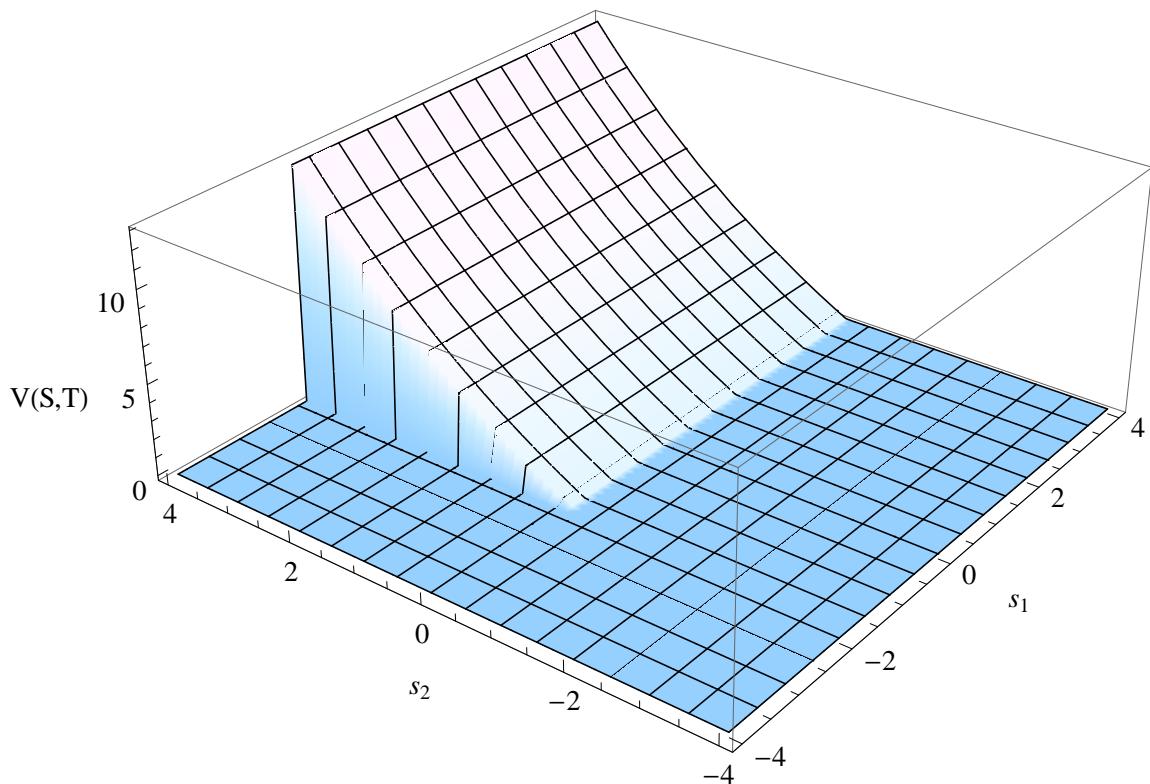
Sheet 4 - Answers

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Task: 1

Plot for the integrand of a two-dimensional Down-Out Call option with barrier B.



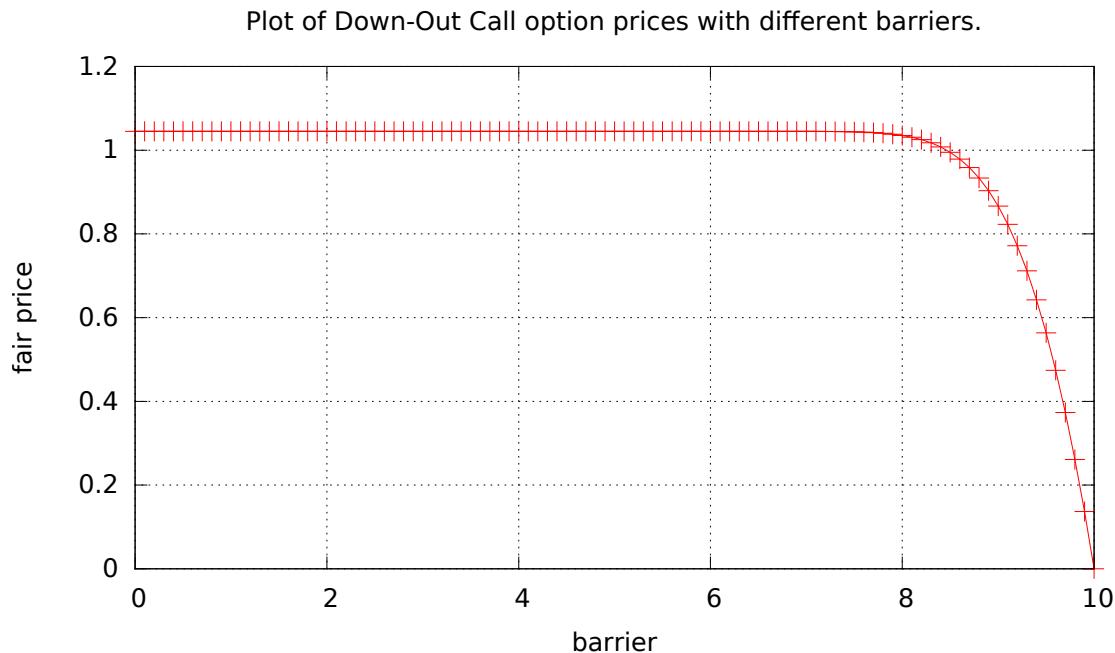
Integrand of 2-dimensional Down-Out Call option.

Task: 2

We get wrong values for our Monte Carlo and Quasi Monte Carlo method. We implemented this task (you can check the Code) but, we get false results.

Task: 3

Plot of the Black Scholes formula for a Down-Out call option.

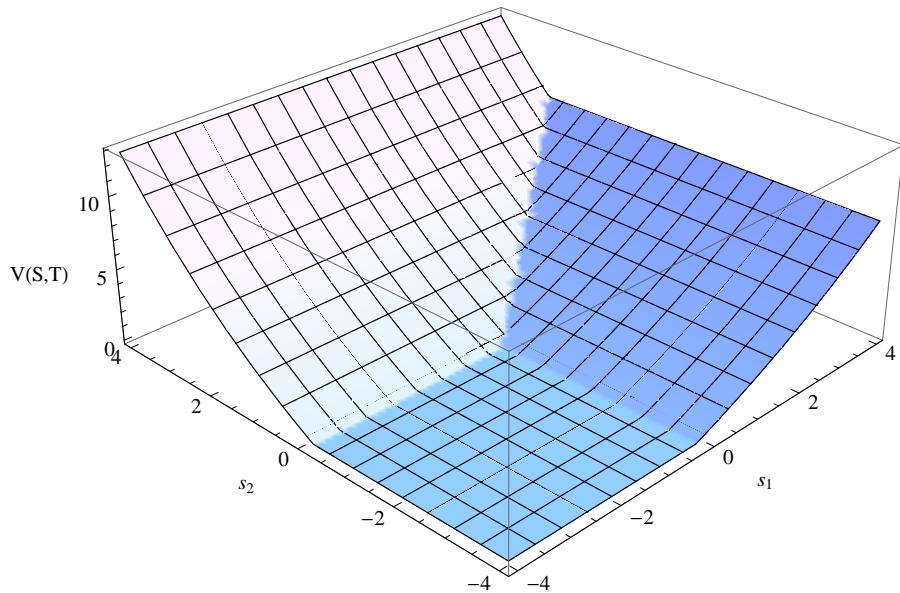


Task: 4

Same as in Task 2. We implemented the Code and get a wrong convergence.

Task: 5

Plot of the discrete time integrand for $M = 2$ with the usual parameters.



Task: 6

Same as in Task 2. We implemented the Code and get a wrong convergence.

Task: 7

Call option implied volatilities computed with Newton-Raphson algorithm with different start values σ_0 and for different actual σ ($2V/(\sqrt{T}S(0)) = 0.0975412$):

actual $\sigma \setminus \sigma_0$	0.0975412	0.0100000	1.0000000	10.0000000	0.1000000
0.0010000	0.0091670	0.0091670	nan	nan	0.0091670
0.0100000	0.0100000	0.0100000	nan	nan	0.0100000
1.0000000	1.0000000	nan	1.0000000	nan	1.0000000
9.0000000	9.0000000	nan	9.0000000	9.0000000	9.0000000

Put option implied volatilities computed with Newton-Raphson algorithm with different start values σ_0 and for different actual σ ($2V/(\sqrt{T}S(0)) = 0$):

actual $\sigma \setminus \sigma_0$	0.0000000	0.0100000	1.0000000	10.0000000	0.1000000
0.0010000	0.0091670	0.0091670	nan	nan	0.0091670
0.0100000	0.0100000	0.0100000	nan	nan	0.0100000
1.0000000	1.0000000	nan	1.0000000	nan	1.0000000
9.0000000	9.0000000	nan	9.0000000	9.0000000	9.0000000

One observed cause for the divergence of the algorithm is that the quotient σ_0/σ diverges too far from one (either is too large or too near to zero).

Task: 9

We looked up some values from "www.onvista.de". We used values of a Gold stock and European call options of UBS with same time of maturity. One can observe the smile and one runaway value.

Volatility smile of European call options
from UBS on gold (maturity at 18.07.14)

