hw_bsm_geometric_asian_option

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- Make sure 'Gbm_1d' class is already in the module 'src/sde_1d_v01.py', and import the followings

In [1]:
```
import numpy as np
from contract_v01 import VanillaOption
from sde_1d_v01 import Sde_1d, Gbm_1d
```

- Create a method 'bsm_geometric_asian_price' in the class 'Gbm_1d', then test the following code

In [2]:
```
'''==============
output: BSM geometric asian option price
==============='''

def bsm_geometric_asian_price(self,
                              otype = 1,
                              strike = 110.,
                              maturity = 1,
                              num_step = 4 #patition number
                              ):
    #-->>> input your code here
    pass

Gbm_1d.bsm_geometric_asian_price = bsm_geometric_asian_price
```

In [3]:
```
'''==============
Test BSM geometric asian option price
==============='''
gbm1 = Gbm_1d(init_state=100., drift_ratio=0.0475, vol_ratio=.2)
gao1 = gbm1.bsm_geometric_asian_price(
                              otype = 1,
                              strike = 110.,
                              maturity = 1,
                              num_step = 4
                              )
#print('>>>>>> geometric call option value is ' + str(gao1))
```

- In the previous section, we have pretty good result on BSM model calibration on the call price of 2-month maturity, see here. We say it is pretty good calibration because the calibrated volatility reproduce 2-mon call price close to corresponding market data. A further step to verify its performance is to use the same calibrated volatility to reproduce other option prices available in the market. In this below, we are going to reproduce geometric asian options given below and justify the calibrated model performance by comparing with the market data.

In [4]:
```
'''===============
market available data
==================='''
#paras for stock price
spot = 100
rate = .05

#paras for geometric asian options
otype = 1
maturity = 2/12
num_step = 8
strike_list = [97, 99, 101, 103]
market_price_list = [
    3.7925736094875964,
    2.5429985313737244,
    1.6026613800895042,
    0.9366198675047346]
```

In [5]:
```
'''================
calibrated volatility based on vanilla options
==================='''
calibarated_vol = 0.18109375000000028
```

In [6]:
```
'''========
your code is in this below
============'''
pass
```