

# CISC 5352 Financial Data Analytics Quiz (2) Extra Credits<sup>1</sup>

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<sup>1</sup>Please turn in your workable codes and corresponding running results.

## Extra credits Polish Monte Carlo simulations (10 points)

1. Write a function with the following signature such that it can handle both call and put options.

```
mc_pricing(S, K, T, r, sigma, option_type, no_trial)
```

- You are required to use the following call and examples to test your function
  - An European call with continuous dividend yield:  $S = 50, K = 80, r = 0.1, T = 5/12, \sigma = 0.35$
  - An European put option on stock indexes with a cost-of-carry:  $S = 80, K = 75, r = 0.1, T = 5/12, \sigma = 0.20$
  - The no\_trial: should be at least  $10^7$
  - Plot your simulation results for the first 5 trials (You can 'relax' the huge trial number a little bit for the sake of visualization)

## Python multithreading programming for Monte Carlo simulations

- Multithreading programming is an important skill in data analytics.
- Go through the following sample multithreading python demo codes to understand multithreading programming basics.
- Convert your Monte Carlo simulation results in to a multithreading version

```
import threading
import time

def addHarmonicSeries(n):
    sum=0.0
    for i in range(1,n):
        sum=sum + 1.0/i
        print('{:5d} {:.12.6f}'.format(i, sum))

start_time = time.clock()
no_thread = 100
for i in range(no_thread):
    t = threading.Thread(target=addHarmonicSeries, args=(i,))
    t.start()
    print("\n-->" + t.getName() + "\n")
    time.sleep(1)

print("\n The main stread stops after {}".format(time.clock()-start_time)\
+ " seconds")
```