Homework 4

Q1

1. Generate a list of the expiry dates of listed U.S. equity monthly options for calendar year 2019 (the monthly equity options expire on the 3rd Friday of the contract month)
2. Convert these expiry dates to the 'time to maturity' as fraction of a year

Q2

1. Download the datafile with a header "stockPx.csv" from blackboard
2. Use csv DictRead to read the datafile into your python session
3. Convert each date string into a datetime object
4. Use defaultDick data structure to hold the following information for each of the 3 stocks
   - the date of maximum stock price
   - the date of minimum stock price
   - number of days between maximum and minimum stock prices

Q3

You are given the following parameters for a stock:

- spot price: 100
- annualized stock return volatility: 50%
- stock dividend yield: 0%
- risk free interest rate: 0%

Use Monte-Carlo simulations to calculate (a) price, (b) delta, (c) gamma, and (d) vega of the following *6-month* European options:

1. At the money call
2. At the money put
3. Call struck at K = 110
4. Put struck at K = 90

Use analytical solution for european options you built previously to validate your results.

You need to think about using identical set of random numbers when computing the first or second order derivatives (why?)