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Options Projects

Maximum: 1 page text per each project, with tables and graphs attached as needed.
Goal / audience: describe effectively to me and my teaching assistant who will help grade these.

Project #1.

Goal: Thoroughly understand the details of option contracts.

- Identify *four* option contracts: two pairs of call and put contracts, each pair being one call and one put on the same underlying asset, with the same expiration date, and with the same strike price:
  - Pick two different underlying assets:
    - one stock or ETF;
    - and the other something more unusual like FX (foreign exchange), a Stock Index, an Interest Rate, a commodity, or LEAPS (examples include but are not limited to the products on cboe.com or ise.com).
  - Pick two expiration periods:
    - one nearby (i.e., the next-to-expire contract);
    - one with a year or more to expiration.
  - Pick pairs of call and put contracts with the same exercise price:
    - One pair that are nearly at-the-money;
    - One pair with the call deep in-the-money and the put deep out-of-the-money, or vice versa.
- Print and briefly discuss excerpts from the bid-ask quote table for each of these two pairs of contracts:
  - Again, check out cboe.com and ise.com for market prices and trade information regarding options. There are other sites that could also be helpful. Be resourceful;
  - Caution: 'Last' prices may be stale, and one cannot know whether that last trade was executed at the bid or the ask, or possibly somewhere in between;
  - Please share information about other web sites that you find helpful.
- Describe in words the *terms* of each of these contracts; describe thoroughly and in detail.
- Find out how much *margin* (in dollars) a broker would require you to post for writing each contract (or make reasonable estimates, briefly describing your reasons).
- Take positions, indicating:
  - which contract(s) you plan to *buy* and which contract(s) you plan to *sell* (one long contract and one short contract are required), at the *closing price on the day after* this assignment is due;
  - *how many* contracts you will trade of each;
  - how much & in what direction will the balance of your brokerage account change;
  - how much you must hold as margin.

Project #2. [Due: ?? I am not sure we will have time for this project.]
Goal: Understand the characteristics and behavior of the options described in Option Project #1, describe certain trading strategies you might undertake, and assess the Value-at-Risk of options.

- Describe the performance of the option positions taken in Option Project #1.
- How closely did Put-Call-Parity hold on the day you purchased the option contracts?
- Construct one trading strategy for each pair of options, perhaps including a position in the underlying asset. (long both the call and put is a straddle; or long the call and short the put is a levered position in the underlying asset a la put-call-parity, etc. — you would need two different strikes for spreads). [Supply an Excel spreadsheet that shows your positions.]
- For only one of the options, assume a reasonable volatility guess/estimate and calculate the Black-Scholes price. (This task will be easier for options on an asset paying continuous or no dividends.) Estimate the volatility implied by the current trading price. (You may use the excel spreadsheet provided to compute implied volatilities.)
- Estimate and interpret the risk parameters: delta, gamma, omega, vega, theta, and rho.
- Estimate the 99% VaR for one of the options. First use the implied volatility (and zero expected return) to estimate the 99% daily VaR for the underlying asset, and then use both delta and gamma to estimate the 99% daily VaR for the option. Provide an example.