**Assignment 4: Volume Profiles and VWAP**

1. Download the stock data for SQ from Piazza.
   1. Load the trade and quote data as in class
   2. Prepare it for use, selecting the appropriate time, fields, set the index, etc.
2. Construct a VWAP profile.
   1. Generate 1-minute bar data from your tick data as discussed in class.
   2. Construct a VWAP profile using one of the two methods discussed in the lecture.
3. Run a modified VWAP algo using tick data.
   1. Support a limit price. I.e. if you supply a limit price with your order you cannot buy above or sell below that price.
   2. Test your algo with six different scenarios. All with order size 300,000 shares.
      1. Buy order with no limit and a threshold of 3000 shares
      2. Sell order with no limit and a threshold of 3000 shares
      3. Buy order with no limit and a threshold of 6000 shares
      4. Sell order with no limit and a threshold of 6000 shares
      5. Buy order with a limit price selected such that you will be unable to trade at all points in time, and a threshold of 1000 shares
      6. Sell order with a limit price selected such that you will be unable to trade at all points in time, and a threshold of 1000 shares
   3. For each simulation run:
      1. plot the stock price throughout the day and your trades in the same panel as in class
      2. show the average trade price, daily VWAP and the difference between them.
   4. Add “cleanup” logic to ensure that the trade fully completes in the last minute if it is not already complete. For example, if your threshold is 3000 shares and you have 200 shares remaining, make sure you finish all shares by sending an aggressive order.
   5. Be sure to use a different period for your training data and your VWAP simulation. For example, if you have 1 month of data, you could develop your curve on the first three weeks of data and then test it on dates in the last week.