* You must choose at least 10 stocks
* I will provide you with instructions on using AlphaVantage web JSON API, but you can use another if you like.
* Your analysis must include 3 strategies.  You can reuse mean reversion and simple moving average, but you need to add one more.

If you have no idea what another strategy could be, you can use Bollinger Bands.  Simply modify the logic to the simple moving average...

    if price > avg\_price \* 1.05   # buy

    elif price < avg\_price \* .95     # sell

* Your program should save the data in csv files (I’ll let you decide the format/columns of the file)
* Your program should be able to save new data into the files.  Meaning, when I go to run your program, it should go get the latest data, update the files, and run new analysis.
* If your program detects a buy signal or sell signal on the last day in the data, print a message like “You should <buy or sell> this stock today”.
* Store your results to your strategy in a results.json, and specifically identify which stock and strategy made the most profit.

**Each project must meet the following 5 project requirements:**

* Obtaining data from a web JSON API (40 points)
* Storing the data in CSV files (40 points)
* The ability to add new data to your dataset.  Meaning, tomorrow you can run your program again, and it will go get the latest data, and run your analysis again. (40 points)
* Perform analysis on the data. (40 points)
* Store your results in a results.json file (40 points)
* (If you choose to do a project of your choice, you **MUST**also turn in a 2 - 4 minute video explaining and running your code)

  (Your program must also use good programming style and comments)

**P.S.**

you will download one year’s worth of stock market prices for ten stocks from Nasdaq

Below are some recommendations if you are having a hard time thinking up stock tickers, but I encourage you to think outside of the box and choose a couple stocks that no one else might think of:

* AAPL
* GOOG
* ADBE
* TSLA
* BA
* CMCSA
* CSCO
* CVX
* JPM
* V
* BRK.B
* FB
* AMZN
* MSFT

To download the prices in a spreadsheet go to:

* [NasdaqLinks to an external site.](https://www.nasdaq.com/)  -> search “TSLA” -> Historical Quotes -> Select: **1Y** -> click Download
* This will save a csv file on your local computer. Rename the file TSLA.csv.
* The csv file will have the columns: Date, Close/Last, Volume, Open, High, Low.
* Reverse sort the data so the oldest day is first in your data.
* Change the data type of the "Close/Last" column to a number so it takes off the "$".
* You only want the “Close/Last” column.  Copy all the prices in the “Close/Last” column.  Create a folder in C9 called “hw4”.  Create a file in the hw4 folder called TSLA.txt.  Paste the prices into the TSLA.txt file.  There should be one price per line and nothing else.

**Sample Output**

AAPL Simple Moving Average Strategy Output:  
buying at:       191.45  
selling at:      189.97  
trade profit:    -1.48  
buying at:       191.24  
selling at:      189.43  
trade profit:    -1.81  
buying at:       193.42  
selling at:      195.89  
trade profit:    2.47  
buying at:       196.94  
selling at:      194.83  
trade profit:    -2.11  
buying at:       185.56  
selling at:      183.63  
trade profit:    -1.93  
buying at:       188.63  
selling at:      192.42  
trade profit:    3.79  
buying at:       187.68  
selling at:      187.15  
trade profit:    -0.53  
buying at:       184.37  
selling at:      182.52  
trade profit:    -1.85  
buying at:       182.63  
selling at:      181.42  
trade profit:    -1.21  
buying at:       172.75  
selling at:      171.37  
trade profit:    -1.38  
buying at:       173.31  
selling at:      171.48  
trade profit:    -1.83  
buying at:       169.67  
selling at:      167.78  
trade profit:    -1.89  
buying at:       175.04  
selling at:      169.38  
trade profit:    -5.66  
buying at:       169.02  
selling at:      169.3  
trade profit:    0.28  
buying at:       173.03  
selling at:      186.88  
trade profit:    13.85  
buying at:       190.29  
selling at:      193.12  
trade profit:    2.83  
buying at:       207.15  
selling at:      209.68  
trade profit:    2.53  
buying at:       213.25  
selling at:      228.88  
trade profit:    15.63  
buying at:       222.08  
selling at:      218.36  
trade profit:    -3.72  
buying at:       219.86  
selling at:      209.27  
trade profit:    -10.59  
buying at:       213.31  
selling at:      224.53  
trade profit:    11.22  
buying at:       226.84  
selling at:      226.49  
trade profit:    -0.35  
buying at:       229.79  
selling at:      222.77  
trade profit:    -7.02  
buying at:       222.66  
selling at:      216.32  
trade profit:    -6.34  
buying at:       220.69  
selling at:      226.21  
trade profit:    5.52  
buying at:       225.77  
selling at:      230.76  
buying at:       233.4  
selling at:      230.1  
trade profit:    -3.3  
buying at:       227.48  
-----------------------  
Total profit:    10.11  
First buy:       191.45  
Percent return:  5.28  
  
AAPL Mean Reversion Strategy Output:  
buying at:       185.64  
selling at:      188.63  
trade profit:    2.99  
buying at:       188.04  
selling at:      178.67  
trade profit:    -9.37  
buying at:       170.85  
selling at:      175.04  
trade profit:    4.19  
buying at:       168.0  
selling at:      173.5  
trade profit:    5.5  
buying at:       186.88  
selling at:      207.15  
trade profit:    20.27  
buying at:       209.68  
selling at:      214.1  
trade profit:    4.42  
buying at:       224.18  
selling at:      216.24  
trade profit:    -7.94  
buying at:       222.77  
selling at:      228.87  
trade profit:    6.1  
buying at:       221.69  
selling at:      231.3  
trade profit:    9.61  
buying at:       225.91  
-----------------------  
Total profit:    35.77  
First buy:       185.64  
Percent return:  19.27

**{  
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        187.44,  
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        189.71,  
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        190.64,  
        191.31,  
        189.97,  
        189.79,  
       etc.         
    ],  
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   "AAPL\_mr\_returns": 19.268476621417804  
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