Assignment

In this assignment, you will implement and analyze the following night trading ("insomnia") strategy:

For your stock, for every day you have the "Open" and "Close" prices. You will investigate the performance of the following "night" strategy. You believe that a stock has "inertia" to continue its movement in the same direction overnight as it did during the day. We assume that before the market closes, you know the closing price for that day. You will trade just before the market closes. You will hold positions overnight and your "insomnia" strategy for every day is as follows:

1. if the "Close" price of today is higher than the "Open" price of today, then the stock increased in price during today. You believe that there is enough upward inertia to carry this upward movement overnight till tomorrow open. Therefore, you buy $100 worth of shares at the "Close" price of today and sell this number of shares at the "Open" price of tomorrow to close your "long" position. The number of shares will typically be fractional, like 1.12 or 0.89. Your profit/loss per share is open(tomorrow) - close(today). You do not have any positions during the day.

2. if the "Close" price of today is lower than the Open" price of today the the stock decreased in price during today. You believe that there is enough downward inertia to carry out this downward movement overnight till tomorrow will continue to decline till tomorrow morning. Therefore, you sell short $100 worth of shares at the "Close" price of today and buy this same number of shares at the "Open" price tomorrow to close your "short" position. You profit loss per share is close(today) - open(tomorrow)

3. unless the "close" price of today equals "open" price of today, you will always "night" trade. assume in both cases (whether you establish a long or short position) that you have $100 to invest and you know the daily behavior of your stock. We ignore trading costs in our analysis.

4. finally, in your computation of percentages, number of shares, prices - round to 2 decimal points.

Here is a simple example to illustrate:
On Monday, before the market closes you see that the stock increased from 101 at open to 101 at close. You believe it will continue to increase during (Monday-Tuesday) night. Therefore, you buy at the close price on Monday evening. On Tuesday morning, you sell at the open price of 110. This overnight trade was profitable.

Day	Open	Close	Daily Change	Action
Monday	100	101	Positive	Buy
Tuesday	110	95	negative	Sell Short
Wednesday	92	90	negative	Sell Short
Thursday	88	85	negative	Sell Short
Friday	90	95	positive	Buy

On Tuesday, your stock declined during the day from 110 to 95. You believe that it will continue to decline during (Tuesday-Wednesday) night. Therefore, you sell short at 95. On Wednesday morning you buy at the open price of 92 to close this short position. This overnight trade was profitable.

On Wednesday, the open price is 92 and close price is 90. You take the short position (you sell short at 90) and close it ("buy") on Thursday at the "Open" price of 88. This overnight trade was profitable.

So far, so good. Your last trades were profitable. You relax during the day on Thursday, catch up on your sleep, work, and coffee. Before market closes on Thursday you look at the price action: the stock opened at 88 and continued to fall to 85. Again you take a short position hoping that the stock will continue to fall during (Thursday-Friday) night. You close this position Friday morning at 90. Contrary to your belief, the stock changed the direction and increased in price. This overnight (Thursday-Friday) trade was unprofitable.

Questions: For all questions, you take the daily data for your stock and for S&P-500

1. what is the average nightly profit for your stocka and "spy"? Since you always start with $100, this number will coincide with percentage profit.

2. is the profit from "long" positions (when you buy) higher or lower than your profit from 'short" positions (when you sell short)? What is more profitable: long or short positions?

3. suppose you add a restriction that you will trade only if the absolute value of daily return is more than some threshold value x (e.g. 5%). (for example, unless stock price rises or falls by more than 5%, you will not trade). With such a restriction, you will trade less frequently but maybe your profit per trade will increase. We would like to investigate this. Take 100 points for x from 0 to 10% and plot the average profit per trade. Please discuss your findings. Any patterns? Any optimal values for x?

4. perform the above analysis separately for long and short positions. Discuss your findings.

5. on the same plot, show the growth of your portfolio for your stock and SPY and buy-and-hold strategy