Assignment 0

InvestoQuest

12th May 2025

Deadline: 15th May 2025

1 Helpful Formulae

- MACD(a, b, c) = EMA(a) − EMA(b) — of closing price
- Signal Line = EMA(c) — of MACD
- EMA or E: Exponential Moving Average
- SMA or S: Simple Moving Average

Q1. Data Preparation

Read the given CSV to load OHLCV data for `AAPL`. Add the following columns:

- % change in closing price each day.
- SMA for $t = 9, 25, 50$ days.
- EMA for $t = 9, 25, 50$ days.
- MACD(12,26,9) and signal line.

Q2. Trading Strategy

Take trades according to the following logic:

Buy:

$$\frac{E50(t) - E50(t-1)}{E100(t) - E100(t-1)} \geq \frac{S50(t) - S50(t-1)}{S100(t) - S100(t-1)}$$

Sell:

$$\frac{E50(t) - E50(t-1)}{E100(t) - E100(t-1)} < \frac{S50(t) - S50(t-1)}{S100(t) - S100(t-1)}$$

Trading Rules

- If the condition is satisfied at the end of the day, place the trade at that day's closing price.
- Only long trades are allowed:
  - Buy is denoted by 1
  - Sell is denoted by -1
  - A sell signal cannot occur before a buy signal.
- Only one trade can be active at a time:
  - A new buy can only occur after a sell.
  - Once a 1 appears, another 1 cannot appear before a -1.

Final Output

A CSV file containing OHLCV data along with the signal column (with 1 for buy, -1 for sell, and 0 otherwise).

Question 3

- Plot the closing price along with E(50) and S(50).
- Plot the MACD histogram.
- Modify the buy formula by bringing the LHS to the denominator of RHS and plot the log of this term alongside the closing price.