QF2103 Computing for Quantitative Finance
Semester 2, AY 2024/2025
Group Project

Instructions:
Due date: 18 April 2025 (Friday) 11:59 PM
Submission: Please upload a **single zipped file** containing your report and executable code to Canvas.

Project Description

As a portfolio management team, you are exploring opportunities to invest in 20 short-listed stocks. The objective is to maximize your return by strategically selecting and allocating funds across 10 chosen stocks. Develop a Python-based trading strategy to identify the optimal stock portfolio that achieves the highest potential return.

Assumptions

For simplicity, the project will adhere to the following assumptions:

- Out of the 20 short-listed stocks, you will fix 10 stocks of your choice for the entire trading period (e.g., always choose stocks 1 to 10).
- Suppose the initial capital is $\$50,000$. You are free to allocate this amount of money to invest in the stock.
- Short-selling is allowed. The limit of short-selling is set to be capped at 50% of the allocated amount per stock. That is, if you wish to take a short position of $500 per stock, then $1,000 need to be set aside.
- Risks of the portfolio will not be part of the evaluation.

Project Details

- Each group member must contribute to the analysis and trading strategy of at least 2 selected stocks to achieve full participation credit.
- Different trading strategies may be applied to different stocks to maximize returns.
- More than 1 share can be traded in each transaction.

- The trading period will span from **1 March 2024 to 16 January 2025**. Stock data for the period **17 January 2024 to 16 January 2025** will be provided. You may use prior data for training, treating **1 March 2024** as the start of the simulation, where daily prices are unknown and must be predicted for trading decisions.
- **Bonus Marks:** An additional 1-month dataset will be provided for further evaluation. Groups with the highest total portfolio returns will receive bonus marks as follows:
  - 1st place: +10 marks
  - 2nd place: +8 marks
  - 3rd place: +6 marks
  - 4th place: +4 marks
  - 5th place: +2 marks

Dataset Description

The market data for the following 20 short-listed stocks, originally sourced from Yahoo Finance, is provided on Canvas:

Ticker	**Company Name**	**Industry**
AAPL	Apple Inc.	Technology
MSFT	Microsoft Corporation	Technology
GOOGL	Alphabet Inc. (Google)	Technology
NVDA	NVIDIA Corporation	Semiconductors
TSLA	Tesla Inc.	Automotive
JNJ	Johnson & Johnson	Healthcare
PFE	Pfizer Inc.	Pharmaceuticals
UNH	UnitedHealth Group Incorporated	Healthcare
XOM	Exxon Mobil Corporation	Energy
CVX	Chevron Corporation	Energy
JPM	JPMorgan Chase & Co.	Financial Services
GS	The Goldman Sachs Group, Inc.	Financial Services
AMZN	Amazon.com, Inc.	E-commerce
WMT	Walmart Inc.	Retail
MCD	McDonald's Corporation	Consumer Goods
KO	The Coca-Cola Company	Consumer Goods
NKE	Nike, Inc.	Apparel
BA	The Boeing Company	Aerospace
CAT	Caterpillar Inc.	Industrials
SOFI	SoFi Technologies	Financial Technology (FinTech)

Table 1: List of selected stocks across various industries

Deliverables

1. Project Report (40%)

The report should include the following sections:

- **Team Roles and Responsibilities:** A table outlining project tasks, team member contributions, and involvement.
- **Selected Stocks and Strategies:** A brief explanation of the chosen 10 stocks, their trading strategy, and rationale.
- **Trading Decisions:** A table documenting daily trading actions from 1 March 2024.
- **Visualization:** Graphs illustrating return trends and trading strategy performance for each stock.
- **Total Return Analysis:** Final returns achieved at the end of the trading period.
- **Future Improvements and Feedback:** Suggestions for enhancements based on project experience.

2. Python Code (30%)

Your code submission should:

- Be fully executable (e.g., `.ipynb` for Jupyter Notebook).
- Include clear and concise documentation.
- Be easily extendable to accommodate additional datasets, in alignment with the bonus scheme.

3. Presentation (30%)

Each group will deliver an 8-minute presentation, including Q&A, covering:

- Key findings and performance insights of the trading strategy.
- Contributions and insights from each group member.
- Presentation grades will be based on both individual and group performance.

4. Participation

Active participation is required from all group members. A member who fails to contribute meaningfully will receive a project grade of 0.