Home Assignment 1

1. Describe the notions of value investors, technical traders, rational investors, andarbitrageurs. Describe the differences between dealers and brokers.

Value investors: buying stocks at a discount to their intrinsic value. Investors believe that the stock market is inefficient and that a company's stock price does not necessarily reflect its true value. Benjamin Graham is the initiator of value investing (and my idol). He proposed the margin of safety method: investing in companies whose intrinsic value is greater than the company's market value and reaches a certain level (i.e., margin of safety). I am a value investor, based on the above views, I believe that the stocks of value investors must have moats. My investment style is turnaround investing.I have invested in these companies before: meta, tsla, tencent, and I also bought BA in November last year. I found that a very important point is that when these large companies encounter problems and troubles, they are usually questioned by various voices in the market. These doubts and questions often seem to affect the company's unique position and moat in the industry, but in fact they do not.

Technical traders: Technical traders focus on market trends, price patterns and historical data for technical analysis. They believe that this data can help predict future price movements. Technical analysis methods originated from the observation of price movements in financial markets over the past hundred years. The theory was created by Charles Dow, the founder of Dow Jones, and is based on three basic assumptions (Wikipedia):
1. Market behavior contains all information
2. Prices evolve in a trending manner
3. History repeats itself
I believe that as a professional trader, technical analysis needs to be combined with fundamentals. Fundamental analysis is usually used to select stocks, while technical analysis is used to find the right time to buy or sell.

Rational investors: generally risk-averse because they seek to maximize returns while minimizing risk. This means that they usually avoid investing in high-risk assets. They will focus on investing in low-risk assets. In addition, rational investors can also use risk management techniques such as diversification to further reduce the risk of potential losses. Basically all large hedge funds are based on rational investment theory. They will diversify their investments to hedge against potential risks in geopolitics, industry cycles, and asset classes. For example, Bridgewater Fund's "Pure Alpha Strategy" and "All Weather Strategy". Use risk-equal investment methods to achieve risk balance in multiple asset classes

Arbitrageurs: Investors who take advantage of market inefficiencies and inefficiencies in the prices of different markets or securities. They go long and short at the same time to profit from price differences without taking significant risks. Bridgewater's Pure Alpha strategy is such an arbitrage strategy. Pure Alpha actively looks for mismatches and pricing errors between asset classes, thereby constructing long and short positions in the hope of generating excess returns in various economic environments. In simple

terms, they look for mispricing in global markets and correct them. They are market correctors. It is the emergence of arbitrageurs like Pure Alpha that improves global market efficiency.

Differences between dealers and brokers:
Dealers: Dealers act as principals and trade securities for their own accounts. Dealers quote and hold an inventory of securities and bear market risk. For example, Citadel Securities. They quote bid-ask spreads in markets such as stocks, options, and foreign exchange, and provide market liquidity by buying and selling securities. But their main profits come from bid-ask spreads and opportunities for market fluctuations. Exchanges also give them Liquidity Rebates.

Brokers: Brokers act as intermediaries between buyers and sellers. They do not trade on their own accounts, but execute trades on behalf of their clients. Brokers make money by executing orders and earning commissions or providing margins, but do not hold inventory or bear market risk. For example, Robinhood and Interactive Brokers

2. Describe the differences between market orders, limit orders, short sell orders, and stop orders.

Market order: Market order does not need to specify the price, buy or sell according to the current market price.
Limit order: Limit order (limit order) needs to specify the transaction price, and it will only be executed when the specified price is reached or a better price is available.
Short order: Short order is to sell high first and then buy low. Short selling is when you do not hold the stock yourself, you need to borrow the stock from the broker and then sell it in the market. After the stock falls, you make up for it in the market at an external price and return it to the broker, resulting in the difference in the middle.
Stop order: Stop order requires setting a stop price. If this price is reached, the order will be triggered at the next best price in the market.

3 Consider LOB below:

(a) How will be matched market buy order of size 300?
A market buy order will consume liquidity from the lowest-priced asks first.
The best ask is 10.30 with size 200 → 200 shares get filled at 10.30.
The buy order still needs 100 shares (300 – 200 = 100).
Next best ask is 10.35 with size 200 → 100 shares get filled at 10.35.

Trades
200 shares traded at 10.30
100 shares traded at 10.35

LOB (after the trade):

order	price	size
Ask1	10.35	100
Bid1	10.25	100
Bid2	10.23	200

(b) What to do if you want to buy 500 units?
If you send a market buy for 500 shares:

Fill 200 at 10.30.
Fill 200 at 10.35.

place a limit‑buy at a high enough price (≥10.35) to sweep the current top of book for 400 shares and still be willing to pay up to that higher limit for the extra 100 shares.Since there are no more asks in the visible book, 100 shares go unfilled unless higher‑priced asks exist beyond 10.35 or new sellers arrive.

How will LOB look and how the bid/ask spread will change if you place

(C) Bid3 = 150@10.27

Ask1: 10.30 (200)
Ask2: 10.35 (200)
Bid1: 10.27 (150) ← **new best bid**
Bid2: 10.25 (100)
Bid3: 10.23 (200)

order	price	size
Ask1	10.30	200
Ask2	10.35	200
Bid1	10.27	150(new)
Bid2	10.25	100
Bid3	10.23	200

The new bid/ask spread is 10.30 − 10.27 = 0.03.

(D) Bid3 = 250@10.24

order	price	size
Ask1	10.30	200
Ask2	10.35	200
Bid1	10.25	100
Bid2	10.24	250(new)
Bid3	10.23	200

The remains bid/ask spread is 10.30 − 10.25 = 0.05

(E) Bid3 = 180@10.23

order	price	size
Ask1	10.30	200
Ask2	10.35	200
Bid1	10.25	100
Bid2	10.23	200
Bid3	10.23	180

The remains bid/ask spread is 10.30 − 10.25 = 0.05.

4. Implement your own version of get_prices.r that checks the presence of a file with prices for a given list of securities in your computing environment and downloads prices from yahoo.finance.com if the file is not present.

The get_prices.r version is the latest and the file containing the prices for a given list of securities exists in the computational environment. If the file does not exist I will use quantmod to download the prices via yahoo.finance.com, as follow code

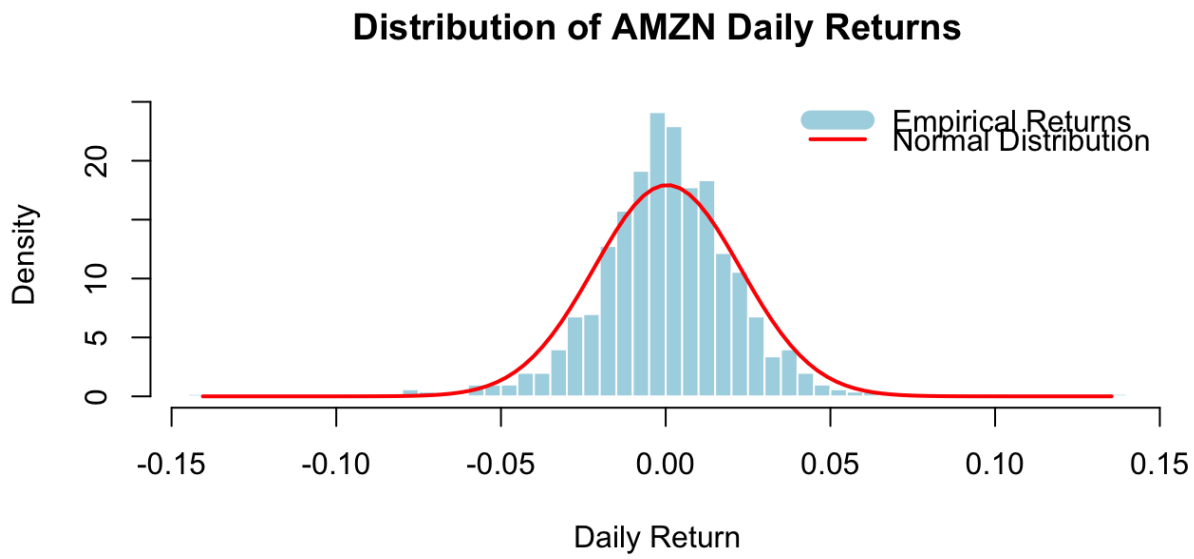
```
install.packages("quantmod")
library(quantmod)
```

5. Choose a unique security (not AAPL or MSFT), put its ticker into Class List, and download four years of adjusted closing prices from finance.yahoo.com. Calculate returns and their statistics: mean, sigma (standard deviation), skewness, and kurtosis.

Consult with:
https://stackoverflow.com/questions/2564258/plot-two-graphs-in-same-plot-in-r

Mean:0.0004614187
sigma (standard deviation):0.02223815
Skewness:0.04176898
Kurtosis:7.905152

Draw the distribution of returns and compare it with the Normal distribution with the same mean and sigma.



scripts are in separate files. Scripts are R language codes.