

Assessment 6: Stock Market

CSCI 128

Background

The stock market and the technologies that powers it is an industry that is expected to reach 1.5 trillion dollars by 2030.

As it has grown, efforts to simulate it to make better investments have grown as well.

However, accurately simulating a stock market is virtually impossible; there are too many factors to consider.

So creators of stock market simulators develop a heuristic, an approximation of the real thing, to simulate it the best they can.

For this assignment, we will be developing a simple stock market simulator.

Problem

You will be writing a market simulator that allows you to make an initial investments into a set a number of companies.

Then it will run the simulation for a set number of periods, where you then enter in the over all performance of the companies and amount of invested money changes accordingly.

Finally you will print out over all performance per company and then the over all performance of your portfolio.

Input

To start, your program will take in:

1. The number of periods to run the simulation for
2. The number of companies that you will be investing in

Then, for each company that you are investing in you will accept two lines of input:

1. The company's stock ticker (ie: Amazon's is AMZN)
2. The amount that you've invested into this company as a float (ie: 102.23)

Then, for each period, you will take a line of representing the overall market performance in the format:

```
ticker1;change1;ticker2;change2;...;tickerN;changeN
```

Of note, the ordering of companies will change and there may be more companies in the overall market than you are invested in.

If a loss will cause you to lose more than your entire investment, then your loss is capped at the the current amount that you have in that company.

The change will be given as a float representing the change in the companies performance since the last period.

For example, if Apple went down 5% and Amazon went up 11%, that would be entered as:

```
AAPL;-0.05;AMZN;0.11
```

Output

Once all periods have been run, you will print out the performance of each of your stock picks. Round here to two decimals If you lost money relative to your initial investment then you will print out in the format:

```
ticker: Loss percent_lost%
```

For example, if your investment in Apple lost 3.14% relative to when you first invested in them, you would print:

```
AAPL: Loss -3.14%
```

Similarly, if you gained money relative to your initial investment then you will print out in the format:

```
ticker: Gain percent_gained%
```

For example, if your investment in Amazon gained 0.25% relative to when you first invested in them, you would print:

```
AMZN: Gain 0.25%
```

Finally, you will print the overall performance of your portfolio in the format:
Overall: initial_investment -> portfolio_value percentage_changed%

Hints

1. You may find it useful to print out the change in each selected stock after each period to make sure that your results make sense.
2. If there is a zero percent change, either gain or loss is accepted as a valid output

Reflection

This week's assessment problem was drastically simplified compared to a real-world investment scenario, and it should hopefully be clear this assignment should not be taken as actual financial advice.

Let's consider the case where it was though. What degree of responsibility and liability do you think you have as the author of this program? What if someone follows your program's "advice" and fails to see the returns promised?

Consider a more professional scenario: You are writing code for a financial calculator application used by a real investment firm. What sort of precautions could you take to protect yourself from legal trouble should your calculator fail to accurately predict an investment outcome?

Sample Executions

Sample Example 1

```
NUM ROUNDS> 2
NUM STOCKS> 1
TICKER> AAPL
INITIAL INVESTMENT> 314.15
SIM PERIOD 1> AMZN;-.05;MSFT;.12;AAPL;1.0
SIM PERIOD 2> AAPL;-.5;AMZN;.3;MSFT;-.3
OUTPUT AAPL: Loss 0.00%
OUTPUT Overall: 314.15 -> 314.15 0.00%
```

Sample Example 2

```
NUM ROUNDS> 2
NUM STOCKS> 1
TICKER> MSFT
INITIAL INVESTMENT> 5
SIM PERIOD 1> AAPL;1.0;AMZN;-0.01;MSFT;.2
SIM PERIOD 2> AAPL;1.0;AMZN;-0.01;MSFT;-2.0
OUTPUT MSFT: Loss -100.00%
OUTPUT Overall: 5.00 -> 0.00 -100.00%
```

Sample Example 3

```
NUM ROUNDS> 2
NUM STOCKS> 2
TICKER> MSFT
INITIAL INVESTMENT> 670
TICKER> AMZN
INITIAL INVESTMENT> 729
SIM PERIOD 1> AAPL;1.0;AMZN;-0.01;MSFT;.2
SIM PERIOD 2> AAPL;1.0;AMZN;-0.01;MSFT;-.21
OUTPUT MSFT: Loss -5.20%
OUTPUT AMZN: Loss -1.99%
OUTPUT Overall: 1399.00 -> 1349.65 -3.53%
```