Individual Project: Quant Strategist's Investment

Background
You are applying for a quant strategist position in the following department at Goldman Sachs. The purpose of this comprehensive project is to provide a concrete example of your data analytics and Python coding skills to demonstrate how you will bring value to the company.

Deliverables and Timeline
Submit your Python code to Canvas before Sunday (Midnight), April 28, 2024.

Department of Portfolio Investment
Long-and-Short Investment in S&P 500 Stocks
Benjamen Graham Value Stock Criteria include:
1) Invest in stocks with higher credit rating (higher Modified Altman Z-Score)
2) Invest in stocks with lower price to book ratio (lower M2B ratio)
For Goldman Sachs, it can also short (sell) stocks with lower credit rating and higher market-to-book.

Function of Your Python Program
1. It reads a file that contains a list of U.S. publicly traded companies (Tickers).
    o Your code needs to create a list of tickers and only buy or sell stocks in this list.
2. It calculates the Modified Altman Z-Score and M2B ratios for each company in the list.
    o Yahoo finance provides accounting data in the last four years; therefore you have four pairs of ratios from 2020 to 2023.
3. At the end of first year, invest in stocks according to the Benjamen Graham Value Stock Criteria
    o Invest $10,000 in stocks with Modified Altman Z-Score that is above the average value (among the stocks in the list). Equally weighed in MV if there are more than one stock in this portfolio.
    o Invest $10,000 in stocks with M2B that is below the average value (among the stocks in the list).
    o Therefore, you have two *equal-weight* investment portfolios: good credit score and low M2B.
    o Investment date is the last market day in that year.
4. Over the next year, keep the investment if the stock is still maintaining its "investable" status:
    o If its Modified Altman Z-Score is still above the average value (among the stocks in that year).
    o If its M2B is still below the average value (among the stocks in that year).
    o The portfolio balance is likely to be more or less than $10,000, but you need to keep it equally weighted after rebalancing while making investment decision.
    o Again, the decision date is the last market day in that year.
5. However, if the stock turns to the opposite of the Benjamen Graham Value Stock Criteria, sell the stock
    o Sell the stock if its Modified Altman z-score falls below the average value (among the stocks in that year), and at the same time, buy the stock with its Modified Altman z-score rising above the average value.
    o Sell the stock if its M2B rises above the average value (among the stocks in that year), and at the same time, buy the stock with its M2B falling below the average value.
6. Report investment returns of both portfolios (again, making sure they are equal weight in stock MV).
    o Calculate the annualized return over the 3-year period 2021-2023.
      $$(1 + R_{Annualized})^3 = (1 + R_{2021}) \times (1 + R_{2022}) \times (1 + R_{2023})$$
    o There is no investment return in 2020 because you invest at the end of 2020 (Accounting data in 2020 is available on 12/31/2020 only).

Modified Altman Z-Score
M-Z-score = 3.25 + 6.56A + 3.26B + 6.72C + 1.05D
A = (Current Assets - Current Liabilities) / Total Assets
B = Retained Earnings / Total Assets
C = EBIT / Total Assets
D = Book Equity / Total Liabilities