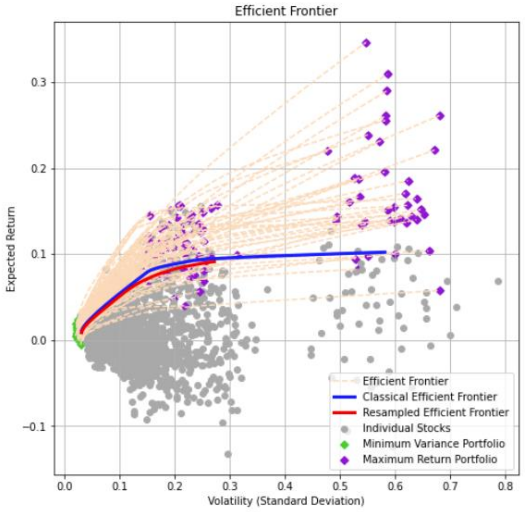
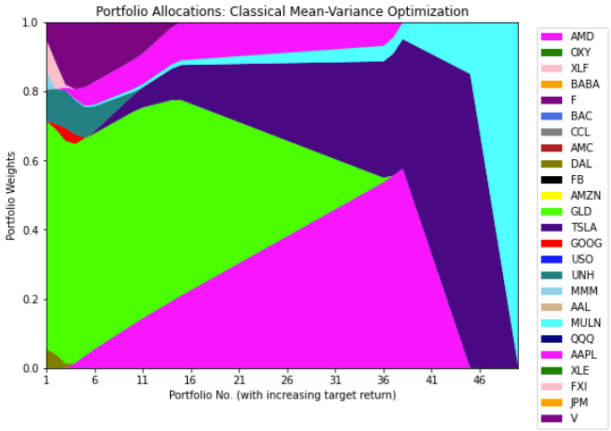
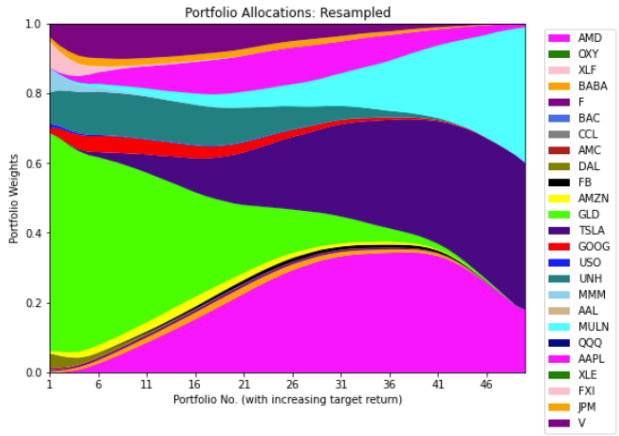
MIE 1624 Assignment 3

3



4





5

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Out-of-sample returns on $1000 investment:

On the Classical Efficient Frontier, the minimum variance portfolio returns $ [28.22424688]
On the Classical Efficient Frontier, the maximum return portfolio returns $ [-582.10477944]
On the Classical Efficient Frontier, the optimal Sharpe ratio portfolio returns $ [279.56668474]

On the Resampled Efficient Frontier, the minimum variance portfolio returns $ [59.06256394]
On the Resampled Efficient Frontier, the maximum return portfolio returns $ [36.84465229]
On the Resampled Efficient Frontier, the optimal Sharpe ratio portfolio returns $ [327.28951255]
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From the out-of-sample performance of 6 portfolios, it is obvious to see that any types of portfolios from resampled efficient frontier perform better than the ones from classical efficient frontier, especially for the maximum return portfolio.

Based on the graph from the 3rd question, we can say that even though two frontiers have the similar shape, the classical efficient frontier has a quicker turn. Thus, we can see there is an obvious corner on classical efficient frontier while comparing to smooth resampled efficient frontier.

According to the graphs from the 4th question, we can see the compositions of classical efficient frontier change more violently than the compositions of resampled efficient frontier. Every stock's weight in the compositions of classical efficient frontier, tends to have a sudden and fierce change as the target return increases. Hence, among the few highest target returns, many stocks' weights quickly decrease to 0 and a few of other ones quickly increase to take the place, like QQQ and MULN. In contrast, the stocks' weights in the compositions of resampled efficient frontier change in a much smoother way as the target return increases. Though the trends are very similar for both compositions, there are still multiple stocks being involved after the 36th portfolio in the compositions of resampled efficient frontier.