The Efficient Market Hypothesis (EMH) asserts that financial markets quickly and accurately incorporate all available information into security prices, making it difficult to consistently outperform the market through stock picking or timing. As soon as a trading signal becomes widely recognized, it gets absorbed into the market, causing prices to adjust and rendering the signal ineffective. This continuous process of price adjustment in response to new information explains why it is increasingly hard to find profitable trading signals today, as the market has already factored in most predictive data and strategies. Doing the cross-sectional regression for two days, one in the past (a) and one more recent (b) , we find that the R^2 value for (a) is 0.045 and for (b) it is 0.001 which indicates that signals lose their potency over time.

I implemented the methodology exactly as described, without making any additional assumptions or deviations in each step, from gathering data to calculating performance metrics. The portfolio in which the stocks are grouped into 3 groups based on the 3-month returns every month and the capital is invested equally into the “top\_third” stocks performed the best when compared to its value-weighted counterpart. Also, the long-short portfolio and the portfolios formed by grouping stocks based on 6-mon and momentum did not perform well when compared to the best performing portfolio. I classified this as the best portfolio due to the various performance\_statistics. Not only was the absolute value of the investment the greatest at the end of the period, but also the sharpe ratio was high, the max drawdown was comparably not too low. The volatility and mean-return were also comparable to other similar performing portfolios.

Based on the graph plot and the updated dataframe after performance stats are calculated, we see that even in the best portfolio there was a drawdown of ~19% in March 2020, this was due to the Covid-19 pandemic and the panic selling triggered by the global recession fears. The combination of high inflation and rising interest rates fueled fears of a global recession in Sept 2022 that caused another big drawdown of 21% as reflected in the plot.