Exercise 2A: Tangency Portfolio

MGMT 675: Generative AI for Finance

Use Claude Code to query the Rice Data Portal for monthly stock price data (end-of-month `closeadj` from the SEP table) for five ETFs of your choice (e.g., SPY, AGG, GLD, VNQ, EFA) and the one-month T-bill rate from FRED. Have Claude Code compute monthly returns and then ask it to:

(a) Estimate expected returns, standard deviations, and correlations from the historical data
(b) Compute the tangency portfolio weights, expected return, standard deviation, and Sharpe ratio
(c) Plot the efficient frontier and the capital allocation line
(d) Re-solve with a **no-short-sales** constraint (all weights ≥ 0)
(e) Re-solve with a **maximum 40% allocation** constraint (no single weight > 0.40)

Compare the portfolio weights and Sharpe ratios across all three cases. Write a one-page memo discussing how constraints affect diversification and performance.

Deliverables.

- Data file (`2A-Data.xlsx`)
- Plot showing all three efficient frontiers (`2A-Plot.png`)
- Memo (`2A-Memo.pdf`, 1 page)