

## Exercise 5A: Sort-Based Portfolios

BUSI 722: Data-Driven Finance II

Load `merged.parquet`. Use predictions from the expanding-window LightGBM backtest (Exercise 4A) or re-run the backtest.

### Submission

Submit a **Jupyter notebook** (`.ipynb`) containing all code, output, and charts. Use markdown cells for any written discussion.

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Using the monthly out-of-sample predictions:

1. **Long-only top decile:** Each month, equal-weight the stocks in the top predicted decile. Compute monthly portfolio returns.
2. **Long-short D10 - D1:** Each month, go long the top decile (equal-weight) and short the bottom decile (equal-weight). Compute monthly returns.
3. **Top quintile vs. top decile:** Compare the long-only top-quintile portfolio to the top-decile portfolio.
4. For each portfolio, report: mean monthly return, annualized volatility, annualized Sharpe ratio, and maximum drawdown.
5. Plot the cumulative returns of all three portfolios on a single chart.