Calculate historical return on capital

In this assignment, we'll calculate return on capital for a pairs trading strategy, using full leverage allowed under RegT margin rule. You will collect necessary data needed for this assignment.

Data collection for period from 09/30/2024 to today

1. Collect SOFR historical rate, you can use Bloomberg or FRED data
2. Collect historical daily price series for NVDA and AVGO using yfinance

Setup

1. Margin requirements, funding/deposit interest rates, stock borrow rate
    a. RegT initial margin
    b. Account variation margin: 40%
    c. Interest rate earned on cash credit: $SOFR - 50bps$
    d. Margin loan financing rate: $SOFR + 50bps$
    e. Assume constant stock borrow rate of 0.5%
2. On 10/1/2024, you start your trading account with
    a. Long $1mm NVDA
    b. Short $1mm AVGO
    c. $1mm cash for margin deposit as required by RegT
3. At the end of each trading day
    a. Calculate accrued interest on the cash debit (don't forget weekend)
    b. Calculate accrued interest earned on cash credit (don't forget weekend)
    c. Calculate the accrued stock borrow cast (don't forget weekend)
    d. Check if account equity is sufficient, i.e. variational margin requirement is met . Top up the account equity if margin call occurs (you are allowed to move excess equity from the long/short side of trade to the other side of the pair trade).
    e. Calculate account equity amount based on
        i. NVDA/AVGO performance
        ii. The interest (a&b) & stock borrow(c)
        iii. Add additional equity if there margin call (d)
    f. Calculate return on equity on this day

Performance statistics and analysis

1. Plot histogram of your daily return
2. Calculate Sharpe Ratio
3. Write a short paragraph on what you've learned from this e