

FIN-221: Machine Learning in Finance
HW 1
Due on September 22, 2025

1. Read up on futures from any resource you like. I recommend the relevant chapter in Hull's book, *Options, Futures, and Other Derivatives*.
2. Exercise 2.1 of the textbook. You can use the programs and modules developed by Hudson and Thames. For futures roll data see https://raw.githubusercontent.com/hudson-and-thames/example-data/main/futures_stitched.csv I have also uploaded a zip file of sample ES data (courtesy of Hudson and Thames).
3. Read the paper *The Volume Clock: Insights into the High Frequency Paradigm*, David Easley, Marcos M. Lopez de Prado, Maureen O'Hara and answer the following questions:
 - What is the volume-clock metric and why is it important?
 - What is the main thesis of the paper regarding HFT vs LFT?
 - Explain how the authors have formed Figure 4 and how they interpret the results?