University of California, Los Angeles
Department of Statistics

Statistics C183/C283 **Instructor: Nicolas Christou**

Project 2

Use the monthly data from 01-Jan-2015 to 01-Jan-2020 for the stocks you selected for project 1.

Answer the following questions:

a. Refer to the lecture material and the paper "An Analytic Derivation of the Efficient Portfolio Frontier," (JFQA, Robert Merton, 1972).Compute A, B, C, D.

b. Compute the values of λ_1 and λ_2 (the two Lagrange multipliers).

c. Suppose an investor has a prescribed expected return E. Find the composition of the efficient portfolio given the return E. Note: You need to choose a value of E.

d. Use your data to plot the frontier in the mean-variance space (parabola)

e. Use your data to plot the frontier in the mean-standard deviation space using the hyperbola method.

f. On the plot in (e) add the 30 stocks, the $S\&P500$, the equal allocation portfolio, the minimum risk portfolio, and the portfolio in (c).

g. Add three arbitrary portfolios on the plot of (c). You can choose any 30 weights with $\sum_{i=1}^{30} x_i = 1$.