Homework 7 (due Nov. 5, 2019)

Problem 1

You have collected data on monthly returns of 10 securities, as shown in the data set provided in the previous assignment.

a) Estimate the expected returns and the covariance matrix of the returns.

b) Consider the problem with an additional riskless asset returning 0.005 each month. Describe the efficient frontier by finding the fund defined in the One-Fund Theorem.

c) Analyze the efficient frontier (by calculating 10 points) for the cases when shorting is *not* allowed. Compare with case b).

Problem 2

You treat the 12 realizations presented in the data set as equally likely scenarios, each with probability 1/12.

You plan to invest $100,000 and you are considering three possible portfolios:

Portfolio 1: All money in asset 9;
Portfolio 2: Money distributed uniformly among all assets (equally weighted);
Portfolio 3: Invest equally in assets 2, 3, 6, 8, and 9 and nothing in the other assets.

Calculate the expected return and the Value at Risk of these portfolios, for the risk levels $\alpha = 0.1$, 0.2, and 0.3.

Problem 3

Assume that the data come from a joint normal distribution (you estimated the means and the covariances last week). For the same three portfolios as in Problem 2, calculate the expected return and the Value at Risk of these portfolios, for the risk levels $\alpha = 0.1$, 0.2, and 0.3.