THE UNIVERSITY
of EDINBURGH

Exercise 1 *Model + Solve*

The file portfolio31.txt has the information of 31 shares in the market (expected return per sterling pound invested and the covariance matrix). Given a capital of £1000:

1. Calculate the optimal portfolio that minimizes the total risk of the investment provided that we would like to have a minimum expected return of £5000. Save the solution to a txt file.

2. Draw a chart of the efficient frontier of the problem. Starting with a minimum return of 1000, solve every problem increasing this value by 250 until you reach an infeasible problem.

Exercise 2 *Model + solve*

Gold-co must determine how many kilograms of gold to mine over the next two years. If Gold-co extracts x_1 kilograms of gold in year one, each kilogram of cold can be sold for £$(30 - x_1)$. If Gold-co extracts x_2 kilograms of gold in year two, each kilogram of cold can be sold for £$(35 - x_2)$. The cost of extracting x_1 kilograms of gold in year one is £x_1 and the cost of extracting x_2 kilograms of gold in year two is £$2x_2$. A total of 20 kilograms of gold are available to mine. Write and solve a quadratic programming model that Gold-co can use to maximise their profits.

Exercise 3 *Solve*

Solve the quadratic programming problem for the orange production firm in Florida that we discussed in class.