

Optimization Methods in Finance

Homework assignment #2

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Problems

1. Solve the two-dimensional problem:

$$\min (x - a)^2 + (y - b)^2 \quad \text{subject to} \quad \begin{cases} 0 \leq x \leq 1, \\ 0 \leq y \leq 1. \end{cases}$$

2. Formulate the following nonlinear problem:

$$\min 2x_1 + 3|x_2 - 10| \quad \text{subject to} \quad |x_1 + 2| + |x_2| \leq 5,$$

as an LP problem.

3. Consider an FX market in which there are N currencies available for trading, and assume that one unit of currency i can be exchanged for f_{ij} units of currency j . Assume that there is a limit u_i on the total amount of currency i that can be traded on any given day. Suppose that we start with B units of currency 1 and we would like to maximize the number of units of currency N that we end up at the end of the day, through a sequence of trades. Provide an LP formulation of this problem. We require the following no-arbitrage condition: for any sequence of currencies i_1, \dots, i_k we have $f_{i_1 i_2} f_{i_2 i_3} \dots f_{i_{k-1} i_k} f_{i_k i_1} \leq 1$.

This assignment is due on November 26