

NUMERICAL OPTIMISATION ASSIGNMENT 8

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EXERCISE 1

Consider a problem to minimise the function

$$\min_x f(x) = \frac{1}{2}x^T Gx + c^T x$$

subject to the constraint

$$Ax \leq b,$$

where $G \in \mathbb{R}^{n \times n}$ symmetric positive semidefinite, $A \in \mathbb{R}^{m \times n}$, $c \in \mathbb{R}^n$, $b \in \mathbb{R}^m$.

- (a) State the KKT conditions for this problem. [20pt]
- (b) Rewrite the constraint using a vector of slack variables $y \in \mathbb{R}^m$, $y \geq 0$ and give the corresponding KKT conditions. [20pt]
- (c) Formulate the dual to the problem in (b) and discuss its properties. [20pt]

EXERCISE 2

Solve the following constraint minimization problem:

$$\min_{(x,y)} f(x,y) = (x - 2y)^2 + (x$$

- (a) Formulate the KKT system. [20pt]
- (b) Solve the KKT system with a method of your choice. Explain briefly your approach. [20pt]

Remark. Submit your solutions via **Turnitin**. This submission should not be longer than 4 pages.