ELEG5481 Signal Processing Optimization Techniques
Tutorial 7

Mar. 17, 2013

Q1. Use CVX to solve the following problem

$$\begin{aligned} \min_{x,y} \quad & c^T x \\ \text{s.t.} \quad & x = Ay \\ & l_y \le y \le u_y, \\ & l_x \le x \le u_x, \\ & x \in \mathbf{R}^m,\ y \in \mathbf{R}^n, \end{aligned}$$

where $A \in \mathbf{R}^{m\times n}$, $l_y, u_y \in \mathbf{R}^n$, $l_x, u_x \in \mathbf{R}^m$, and $c \in \mathbf{R}^m$ are given data.

Q2. Use CVX to solve the following problem

$$\begin{aligned} \min_{x,y} \quad & x^T Q_0 x \\ \text{s.t.} \quad & x = Ay \\ & x^T Q_i x \le b_i,\ i = 1, \ldots, p \\ & y \le u, \\ & x \in \mathbf{R}^m,\ y \in \mathbf{R}^n, \end{aligned}$$

where $A \in \mathbf{R}^{m\times n}$, $Q_i \in \mathbf{S}_+^m$, $b \in \mathbf{R}^p$, and $u \in \mathbf{R}^n$ are given data.

Q3. Use CVX to solve the following problem

$$\begin{aligned} \min_{X} \quad & \mathbf{tr} CX \\ \text{s.t.} \quad & X \in \mathbf{H}_+^n, \\ & \mathbf{tr} A_i X \le b_i, i = 1, \ldots, p, \\ & \mathbf{tr} E_j X = f_j, j = 1, \ldots, q, \end{aligned}$$

where the given data are $C \in \mathbf{H}^n$, A_i, $E_j \in \mathbf{H}^n$, $b_i \ge 0$, and $f_j \ge 0$. Here, $\mathbf{H}_+^n$ denotes the set of Hermitian semidefinite matrix.