NATIONAL UNIVERSITY OF SINGAPORE
Department of Mathematics
Semester 1 (2003/2004) MA4253 Mathematical Programming Tutorial 8

Q1. Find a basic feasible solution to the system $w - Mz = q, w \geq 0, z \geq 0$. Here

$$M = \begin{bmatrix} 1 & 1 & 3 & 4 \\ 5 & 3 & 1 & 1 \\ 2 & 1 & 2 & 2 \\ 1 & 4 & 1 & 1 \end{bmatrix}, \quad q = \begin{bmatrix} -1 \\ 2 \\ 1 \\ -3 \end{bmatrix}.$$

Q2. Consider the linear programming

$$\begin{aligned} \min \quad & c^T x \\ \text{s.t.} \quad & Ax \geq b \\ & x \geq 0\,, \end{aligned} \tag{1}$$

(i) Write down the KKT system for problem (1).

(ii) Reformulate the KKT system obtained in part (i) as an LCP.

Q3. Reformulate the following quadratic programming problem as an LCP:

$$\begin{aligned} \max \quad & 2x_1 - 3x_2 - 2x_1^2 - 3x_1x_2 - 2x_2^2 \\ \text{s.t.} \quad & x_1 + 2x_2 \leq 6 \\ & -x_1 + 2x_2 \leq 4 \\ & x_1, x_2 \geq 0\,. \end{aligned} \tag{2}$$

Q4. All questions in the Mid-Term test.