CS525 Open-Book Final Exam

Tuesday, May 14, 1996
12:25 p.m., 594 Van Hise

Answer all questions: 1, 2, 3a, 3b. If any question is missing from your sheets, inform the instructor.

Problems 1 and 2 can be solved by 2 pivots each.

Last Name (Print):____________________

First Name: ________________________

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Do not write anything on this page.

Grades

1. **Question 1:**————————
2. **Question 2:**————————
3. **Question 3:**————————
4. **Total:**——————————

1. (10 points)

$$
\begin{array}{ll}
\text{minimize} & x_1^2 - x_1x_2 + \frac{x_2^2}{2} - 3x_1 + 2x_2 \\
 & \begin{array}{rcrcr} -4x_1 & + & 3x_2 & \geq & -9 \end{array} \\
\text{subject to} & \begin{array}{rcrcr} 5x_1 & + & 2x_2 & \geq & 1 \end{array} \\
 & \begin{array}{rcrcr} x_1 & , & x_2 & \geq & 0 \end{array}
\end{array}
$$

Problem 1 Sheet

2. (10 points) Solve for all values of the parameter t in the interval $(-\infty, \infty)$. Fill in the summary table on the next page with three columns: parameter t range, minimum value $z(t)$ and solution point $x(t)$.

$$\begin{array}{lrcrcr} \text{minimize} & \multicolumn{5}{l}{x_1 + x_2 + t(\frac{x_1}{2} - x_2)} \\ & x_1 & - & x_2 & \geq & -1 \\ \text{subject to} & x_1 & - & 2x_2 & \geq & -4 \\ & x_1 & , & x_2 & \geq & 0 \end{array}$$

Problem 2 Sheet

Paremeter t Range	Minimum Value $z(t)$	Solution Point $x(t)$

3. (10 points) For each claim below, state first whether it is **true** or **false**. Then in no more than two or three sentences justify your answer. An unjustified "True" or "False" answer gets no credit.

(3a)(5 points) Let A be an $m \times n$ matrix. There exist $x \in R^n$ and $u \in R^m$ such that

$$Ax > 0, \; A'u = 0, \; 0 \neq u \geq 0$$

Check one: **True**: **False**:

(3b)(5 points) The LCP

$$0 \leq x \perp Mx + q \geq 0$$

always has a solution when M is a Z-matrix.

Check one: **True**: **False**: