

# CS525 Open-Book Final Exam

Sunday May 10, 1998  
2:45 p.m., 5106 Social Sciences

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

Each of Problems 1 and 2 can be completely solved by 2 pivots only.

Last Name (Print): \_\_\_\_\_

First Name: \_\_\_\_\_

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## Grades

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

1. (10 points)

$$\begin{aligned} & \text{minimize} && \frac{1}{2}x_1^2 - x_1x_2 + \frac{1}{2}x_2^2 - x_1 + x_2 \\ & \text{subject to} && x_1 - x_2 \geq -1 \\ & && x_1, x_2 \geq 0 \end{aligned}$$

**Answer:**

$x_1 =$	$x_2 =$	Minimum=
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## Problem 1 Sheet

2. (10 points) Solve:  $\min_{x \geq 0} \|Ax - b\|_\infty$  for the system  $Ax = b$ :

$$\begin{aligned}x_1 + x_2 &= 0 \\x_1 - x_2 &= 2\end{aligned}$$

Note that  $x \geq 0$ .

**Answer:**

$x_1 =$	$x_2 =$	Minimum =
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## Problem 2 Sheet

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

$$\begin{aligned}\alpha = p'\bar{x} &= \min\{p'x \mid Ax \geq b, x \geq 0\}, A\bar{x} \geq b, \bar{x} \geq 0 \\ \beta &= \min\{p'x \mid Bx \geq d, x \geq 0\}.\end{aligned}$$

If  $B \geq A$  and  $d \leq b$ , then  $\alpha < \beta$ .

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

**Justification:**

**(3b)**(5 points) If  $z$  solves

$$\min\{z'(Mz + q) \mid Mz + q \geq 0, z \geq 0\},$$

then  $z$  solves the LCP:

$$0 \leq z \perp Mz + q \geq 0$$

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

**Justification:**