

CS525 Open-Book Midterm Exam

Thursday, March 9, 2000, 7:30 a.m.–9:15 a.m.
Room 1240 Computer Sciences & Statistics

- (i) If a problem has a solution, no solution, or an unbounded objective function, you must clearly state so and **justify** your claim, for the **original given** problem.
- (ii) Solve each problem using as few pivots as possible. The whole exam can be solved by a total of 4 pivots only.
- (ii) Place the **final** complete answer to each problem after you have solved it on lines immediately below the question.

Last Name (Print): _____
First Name: _____

Grades

- 1. **Question 1:** _____
- 2. **Question 2:** _____
- 3. **Question 3:** _____
- 4. **Question 4:** _____
- 5. **Total:** _____

1. Solve:

$$\begin{array}{rclclcl} x_1 & - & x_2 & - & x_3 & = & -1 \\ -x_1 & + & 2x_2 & & & = & 2 \\ x_1 & + & x_2 & + & -3x_3 & = & -1 \end{array}$$

Answer: _____

Scratch Sheet

2. Solve without changing the number of variables or constraints:

$$\begin{array}{rllllll} \text{minimize} & & -x_1 - x_2 + 2x_3 & & & & \\ & x_1 & + & 3x_2 & - & 2x_3 & \geq & 1 \\ & x_1 & + & x_2 & - & x_3 & = & 1 \\ \text{subject to} & & 2x_2 & - & x_3 & & \geq & -1 \\ & x_1 & , & x_2 & & & \geq & 0 \\ & & & & & x_3 & : & \text{free} \end{array}$$

Answer: _____

Scratch Sheet

3.

$$\begin{array}{rllll} \text{minimize} & & -3x_1 - x_2 + x_3 & & \\ & -13x_1 & + x_2 & - 2x_3 & \geq -1 \\ \text{subject to} & x_1 & & + x_3 & \geq -2 \\ & 2x_1 & + x_2 & + 3x_3 & \geq -1 \\ & x_1 & , & x_2 & , & x_3 & \geq 0 \end{array}$$

Answer: _____

Scratch Sheet

4.

$$\begin{array}{rcll} \text{minimize} & & x_1 + 2x_2 + x_3 & \\ & x_1 - 2x_2 - x_3 & \geq & 3 \\ \text{subject to} & -x_1 + x_2 + x_3 & \geq & -1 \\ & -x_1 + 4x_2 + 2x_3 & \geq & -8 \\ & x_1, x_2, x_3 & \geq & 0 \end{array}$$

Answer: _____

Scratch Sheet