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:

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

Answer:____

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Scratch Sheet

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

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

Answer:____

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Scratch Sheet

3.

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

Answer:____

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Scratch Sheet

4.

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

Answer:

Scratch Sheet