

CO327 (2022Spring) Assignment 1

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May 4, 2022

- Assignment deadline: May-16 23:55.
- Send your electronic copy to ms3ang@uwaterloo.ca
- When answering the questions, show your working steps.

1 Solving system of linear inequalities (8 points)

Determine if the following system of inequalities has a solution.

- If the system has a solution, give one solution.
- If the system has no solution, explain why.

Show your working steps.

$$\begin{array}{rccccrcrcrcr} x_1 & + & 2x_2 & + & 2x_3 & \geq & 1 & & & & \\ -x_1 & + & x_2 & + & x_3 & \geq & 2 & & & & \\ x_1 & - & x_2 & + & x_3 & \geq & 1 & & & & \\ & & -x_2 & - & 3x_3 & \geq & 0 & & & & \end{array}$$

2 Transform to canonical form and standard form (22 points)

2.1 Transform the LP into canonical form, shows the working steps (8 points).

$$\begin{array}{ll} \min_{x_1, x_2, x_3} & 0 \\ \text{s.t.} & 1x_1 + 3x_2 = 5 \\ & 2x_1 + 4x_3 \geq 6 \\ & 2 \leq x_2 \leq 4 \end{array}$$

Also write down the vector \mathbf{c} , \mathbf{b} and matrix \mathbf{A} .

2.2 Transform the LP into standard form (7 points)

$$\begin{array}{ll} \min_{x_1, x_2} & 5x_1 + 2x_2 \\ \text{s.t.} & 6x_1 + x_2 \geq 6 \\ & 4x_1 + 3x_2 \leq 12 \end{array}$$

2.3 Transform the LP of 2.1 to standard form (7 points).

END of assignment 1.