南方科技大学
SOUTHERN UNIVERSITY OF SCIENCE AND TECHNOLOGY

**DDL: 14:00 Thursday of the fifteenth academic week (May 29th) .**

**The homework contains 4 questions and the score is 100 in total.**

1. (25 marks) Write a survey (2 pp+) on one of the following methods. There is a long and interesting story behind each method. Add some details to share with your peers.
   - Criss-cross algorithm
   - Fourier-Motzkin elimination
   - Karmarkar's algorithm
   - Nelder-Mead simplicial heuristic
   - Pivoting rule of Bland, which avoids cycling
2. (25 marks) Study Matlab linear programming section. Write your own simplex code to display all the intermediate steps to solve a linear programming problem.
3. (25 marks) Solve problems using simplex method.
   (a)

$$\begin{aligned} &\text{Maximize } 10x + 35y \\ &\text{subject to} \\ &8x + 6y \le 48 \quad \text{(board-feet of lumber)} \\ &4x + y \le 20 \quad \text{(hours of carpentry)} \\ &y \ge 5 \quad \text{(demand)} \\ &x, y \ge 0 \quad \text{(nonnegativity)} \end{aligned}$$

(b)

$$\begin{aligned} &\text{Minimize } 5x + 7y \\ &\text{subject to} \\ 2x + 3y &\geq 6 \\ 3x - y &\leq 15 \\ -x + y &\leq 4 \\ 2x + 5y &\leq 27 \\ x &\geq 0 \\ y &\geq 0 \end{aligned}$$

4. (25 marks) Use the **Simplex Method** to find both the maximum solution and the minimum solution. Assume $x \geq 0$ and $y \geq 0$ for each problem.

   (a) Optimize $2x + 3y$ subject to

$$\begin{aligned} 2x + 3y &\geq 6 \\ 3x - y &\leq 15 \\ -x + y &\leq 4 \\ 2x + 5y &\leq 27 \end{aligned}$$

   (b) Optimize $6x + 4y$ subject to

$$\begin{aligned} -x + y &\leq 12 \\ x + y &\leq 24 \\ 2x + 5y &\leq 80 \end{aligned}$$

**Hint: You can reasonably use any AI tools to assist you in completing your homework. Attention: Please submit ONLY the PDF of your homework to jzlisustc@gmail.com to keep record.**