Linear Programming

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1 Notes

Linear functions: $f(x_1, x_2, \ldots, x_n) = a_1x_1 + a_2x_2 + \cdots + a_nk_n = \sum_{j=1}^{n} a_jx_j$

Linear equalities: $f(x_1, x_2, \ldots, x_n) = b$

Linear inequalities: $f(x_1, x_2, \ldots, x_n) \leq b$ and $f(x_1, x_2, \ldots, x_n) \geq b$

Standard form: Maximization of $\sum_{j=1}^{n} c_jx_j$ s.t. $\sum_{j=1}^{n} a_{ij}x_j \leq b_i \quad$ for $i = 1, 2, \ldots, m$ and $x_j \geq 0 \quad$ for $i = 1, 2, \ldots, n$

Slack form:

Feasible solution:

Goal: The goal is to maximize or minimize the **objective fuction** to obtain the **objective value**.

Basic variable: Variables on the "left-hand" side of the slack form

The simplex algorithm: Move from one vertex to another by making a basic variable become nonbasic and making a nonbasic variable become basic (pivoting)

Problems: Identify: linear programs with no solution, linear programs with no finite optimal solution and linear programs with origin not in feasible region

2 Outline