Engineering Optimization Homework

Tai Jiang

January 2024

1 Big M AND The Two-Phase Method

Max $z = 2x_1 + 3x_2$
s.t.

- $x_1 + 2x_2 \leq 4$
- $x_1 + x_2 = 3$
- $x_1, x_2 \geq 0$

$$\begin{array}{rrrrrr} z & -2x_1 - 3x_2 & & + M\bar{x}_4 & = 0 & \\ & x_1 + 2x_2 & +x_3 & & = 4 & (1) \\ & x_1 + x_2 & & + \bar{x}_4 & = 3 & \end{array}$$

$$\begin{array}{rr} & Z - 2x_1 - 3x_2 + M\bar{x}_4 = 0 \\ & -M(x_1 + x_2 + \bar{x}_4 = 3) \quad (2) \\ \textbf{new} & Z - (M+2)x_1 - (M+3)x_2 = -3M \end{array}$$

Iteration	Basis Variable	Eq.	Coefficient of:					Right Side
			Z	x_1	x_2	x_3	x_4	
	Z	(0)	1	$-(M+2)$	$-(M+3)$	0	0	$-3M$
0	x_3	(1)	0	1	2	1	0	4
	$\bar{x}_4$	(2)	0	1	1	0	1	3
	z	1	-4	-3	-6	0	0	0
2	x_2	0	0	2	0	0	0	20
	x_4	0	2	2	3	0	1	1