

SIMPLEX METHOD-2

$$\min. -x_1 - x_2$$

m constraints.

$$-x_1 + x_2 \leq 1 \quad +x_3 = 1$$

n variables

$$x_1 \leq 3 \quad +x_4 = 3$$

$$x_2 \leq 2 \quad +x_5 = 2$$

$$x_1, x_2 \geq 0$$

new problem $Ax = b$.

$$A = \begin{bmatrix} x_1 & x_2 & x_3 & x_4 & x_5 \\ -1 & 1 & 1 & 0 & 0 \\ 1 & 0 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \\ x_5 \end{bmatrix} = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$$

$\underbrace{\hspace{10em}}_{\substack{\rightarrow m \times m \\ \text{matrix}}}$

m constraints

n variables.

$$Bx = b$$

$$x = B^{-1}b$$

 $B = \{ \text{set of basic variables} \}$

$$\min -x_1 - x_2$$

$$B = \{x_3, x_4, x_5\}$$

$$B = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} x_B \end{bmatrix} = \begin{bmatrix} 1 \\ 3 \\ 2 \end{bmatrix} \quad x_B = \begin{bmatrix} 1 \\ 3 \\ 2 \end{bmatrix}$$

$$x = \begin{bmatrix} 0 \\ 0 \\ 1 \\ 3 \\ 2 \end{bmatrix}$$

need not be best x

$$x_{\text{new}} = x + \theta d$$

$$\begin{bmatrix} x'_B \\ 0 \\ 0 \\ 0 \end{bmatrix} = \begin{bmatrix} x_B \\ 0 \\ 0 \\ 0 \end{bmatrix} + \theta \begin{bmatrix} db \\ 0 \\ 0 \\ 0 \end{bmatrix} \quad \text{direction vector}$$

enters
leaves.

$$x_3 = 1 + x_1 - x_2$$

$$x_4 = 3 - x_1$$

$$x_5 = 2 - x_2$$

$$Ax_{\text{new}} = Ax = b$$

$$A \begin{bmatrix} d_j \\ 0 \\ 0 \end{bmatrix} = 0 \quad Ad = 0$$

$$\begin{pmatrix} 0 \\ b \\ 12 \end{pmatrix}$$

$$Bd_B + A_j = 0$$

→ j^{th} column of A

$$d_B = -B^{-1}A_j$$

book name?

1 (a)

$$\cancel{2x_2} + x_3 + x_4$$

$$(15) \quad 2x_1 + x_2 + x_3 + x_4 = 14$$

$$4x_1 + 2x_2 + 3x_3 + x_5 = 28$$

$$2x_1 + 5x_2 + 5x_3 + x_6 = 30$$

$$x_4 = 14 - 2x_1 - x_2 - x_3$$

$$x_5 = 28 - 4x_1 - 2x_2 - 3x_3$$

$$x_6 = 30 - 2x_1 - 5x_2 - 5x_3$$