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(1953) King (1954) Heady

MGA

MGA

(Chang et al., 1982;

Harrington & Gidley, 1985)

(1987) Burton et al.

Adularia &

Rubenstein-Montano & Zandi (1998) Ajibefun

Hung (2000) Rubenstein-Montano et al. (1999)

(2005) et al.

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MGA

⋮

Maximize  $z = \sum_{j=1}^n c_j x_j$  ( )

Subject to:

$\sum_{j=1}^m a_{ij} x_j \leq b_i$  for  $i = 1, 2, \dots, m$

$x_j \geq 0$

$c_j$   $z$   $a_{ij}$   $x_j$   $b_i$

(Russell & Thaler, 1985)

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4. Modeling to Generate Alternatives (MGA)

- 1. Nearly optimal linear programming
- 2. Rational
- 3. Quasi-rational

:(Jeffrey et al., 1992)

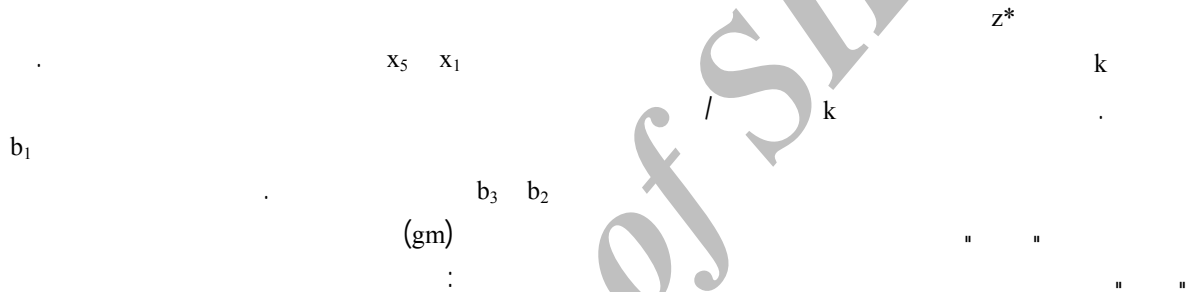
Minimize  $\sum_{j=1}^n x_j$  (for non-zero xs)

Subject to: (

$$\sum_{j=1}^n c_j x_j \geq (1-k)z^*$$

$$\sum_{i=1}^m a_{ij} x_j \leq b_i \text{ for } i = 1, 2, \dots, m$$

$$x_j \geq 0$$



Maximize  $z_1 = gm_1 * x_1 + gm_2 * x_2 + gm_3 * x_3 + gm_4 * x_4 + gm_5 * x_5$

s.t.:

$$b_{11} * x_1 + b_{12} * x_2 + b_{13} * x_3 + b_{14} * x_4 + b_{15} * x_5 \leq b_1$$

$$b_{21} * x_1 + b_{22} * x_2 + b_{23} * x_3 + b_{24} * x_4 + b_{25} * x_5 \leq b_2$$

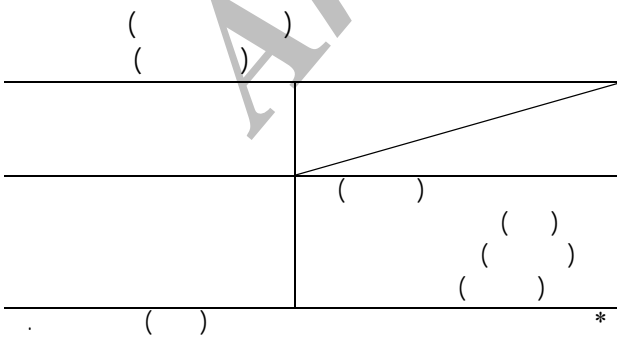
$$b_{31} * x_1 + b_{32} * x_2 + b_{33} * x_3 + b_{34} * x_4 + b_{35} * x_5 \leq b_3$$

$$x_1, x_2, x_3, x_4 \text{ and } x_5 \geq 0$$

gm

$b_{ij}$

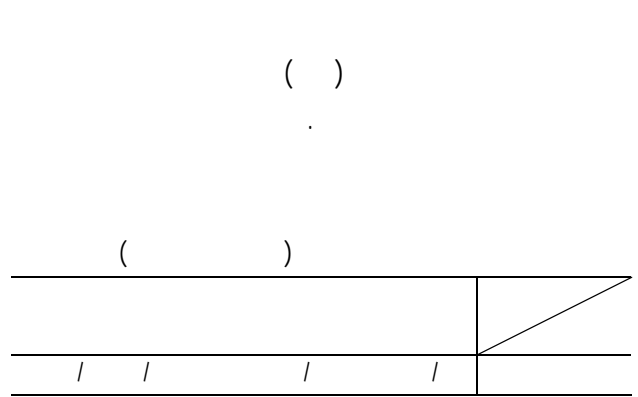
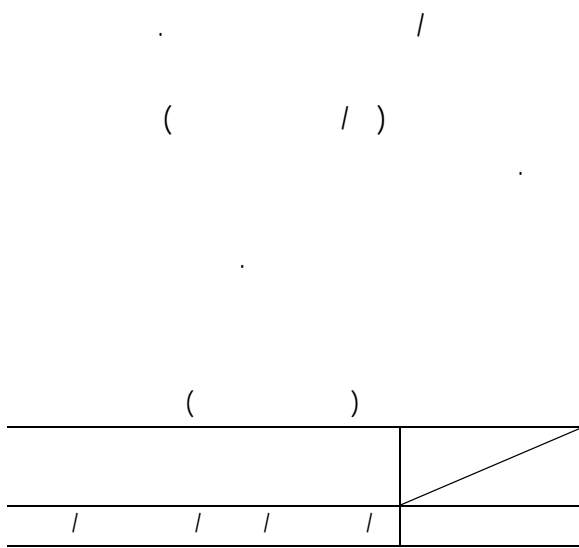
(non-zero variables)



$b_3 \quad b_2 \quad b_1$

$$\sum_{j=1}^n c_j x_j \leq (1+k)z^*$$

1. Gross margin (gm)



MGA

Minimize  $z_2 = x_1 + x_3 + x_5$

s.t.:

$gm_1 * x_1 + gm_2 * x_2 + gm_3 * x_3 + gm_4 * x_4 + gm_5 * x_5 \geq 0.95 * Maxz_1$

$b_{11} * x_1 + b_{12} * x_2 + b_{13} * x_3 + b_{14} * x_4 + b_{15} * x_5 \leq b_1$

$b_{21} * x_1 + b_{22} * x_2 + b_{23} * x_3 + b_{24} * x_4 + b_{25} * x_5 \leq b_2$

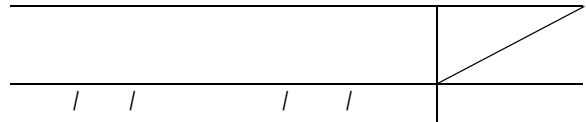
$b_{31} * x_1 + b_{32} * x_2 + b_{33} * x_3 + b_{34} * x_4 + b_{35} * x_5 \leq b_3$

$x_1, x_2, x_3, x_4 \text{ and } x_5 \geq 0$

Maxz<sub>1</sub>

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10. Rubenstein-Montano, B., Anandalingam, G. & Zandi, I. (2000). A genetic algorithm approach to policy design for consequence minimization. *European Journal of Operational Research*, 124, 43–54.
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