Titre

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$$\text{Min } z = \sum_{j=1}^{n} c_j x_j \tag{0.1}$$

$$\text{s.a} \sum_{j=1}^{n} a_j x_j = b_i \tag{0.2}$$

$$\text{where } i = 1, ..., m \text{ and } j = 1, ..., n \text{ with } x_j \geq 0$$

$$\text{Min } z = c_1 x_1 + c_2 x_2 + ... + c_n x_n \tag{0.3}$$

$$\text{sa } a_{11} x_1 + a_{12} x_2 + ... + a_1 n x_n = b_1 \tag{0.4}$$

$$\begin{matrix} --- & & - -- \\ --- & & - -- \end{matrix}$$

$$a_{m,1} x_1 + a_{m,2} x_2 + ... + a_{m,n} x_n = b_m \tag{0.5}$$

a) Input variable b) Output variable i) if $a_{i,s} \leq 0, i = 1, ..., m$. Then the problem is unbounded inferiorly (no optimal solution)

$$x_1 + a_{i,s} x_s = b_1 \rightarrow \; x_1 = b_1 - a_{i,s} x_s \tag{0.6}$$

ii) if $a_{i,s} > 0$ for at least one index i, then x_s is increased until one dependant variable cancels out to zero. Like:

$$x_i = b_i - a_{i,s} x_s \tag{0.7}$$

$$\text{if } x_s = \frac{b_i}{a_{i,s}} \text{ then } x_i = 0 \text{ (Ratio)} \tag{0.8}$$

The biggest value that x_s can take is:

$$\text{Min } i =, 1..., m \text{ of } \left\{ \frac{b_i}{a_{i,s}} \text{ such that } a_{i,s} > 0 \right\} \tag{0.9}$$

$$\begin{array}{cccc} & \boldsymbol{x_s} & \boldsymbol{x_j} & \\ x_i & a_{i,s} & a_{i,j} & b_i \\ x_r & a_{r,s} & a_{r,j} & b_r \end{array} \tag{0.10}$$

$$\rule{4cm}{0.4pt} \tag{0.11}$$

c) Pivot

- for the line r

$$\overline{a}_{r,j} = \frac{a_{r,j}}{a_{r,s}}, j = 1..., n \tag{0.12}$$

$$\overline{b}_r = \frac{b_r}{a_{r,s}} \tag{0.13}$$

- For any ligne $i \neq r,\ i = 1, ..., m$

$$\overline{a}_{i,j} = a_{i,j} - a_{i,s}\frac{a_{r,j}}{a_{r,s}}\ j = 1, .., n \tag{0.14}$$

$$\overline{b}_i = b_i - a_{i,s}\frac{b_r}{a_{r,s}} \tag{0.15}$$

For the objective:

$$\overline{c}_j = c_j - c_s\frac{a_{r,j}}{a_{a_r,s}} \tag{0.16}$$

$$-\overline{z}_0 = -z_0 - c_s\frac{b_r}{a_{r,s}} \tag{0.17}$$