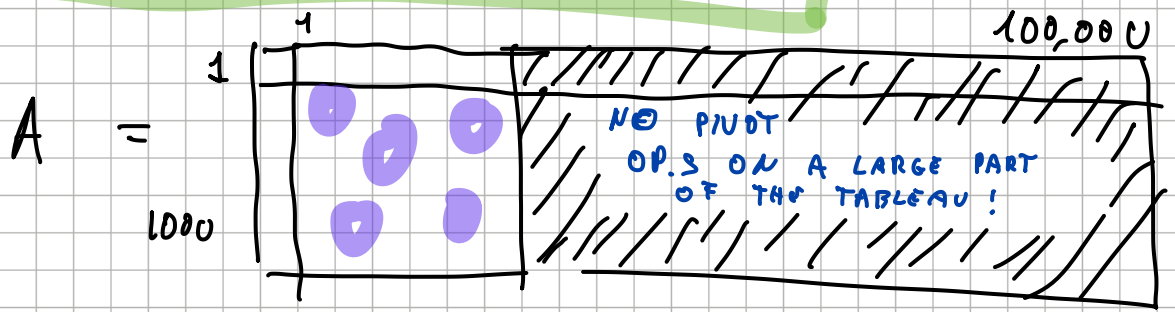


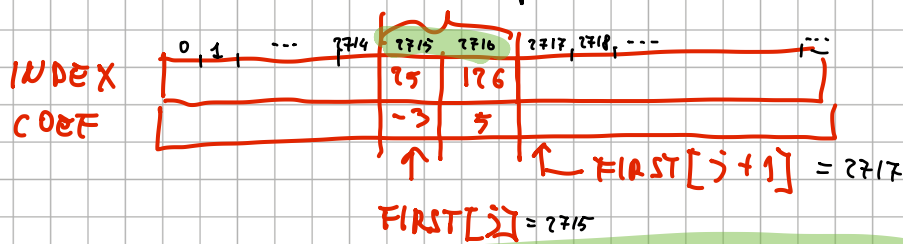
REVISED SIMPLEX METHOD



pivot op. $\sim 3m = 3000$

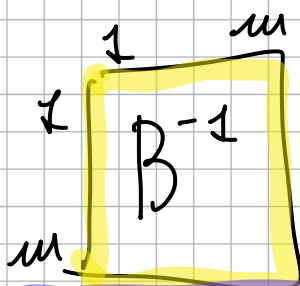
- 97% are NON-BASIC from begin to end ...
- A is very sparse (95% of the entries are typically = 0)

A stored in sparse form:

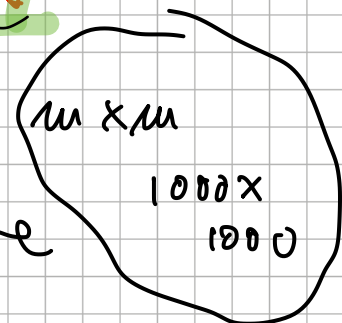


$FIRST[j] \dots FIRST[j+1] - 1$

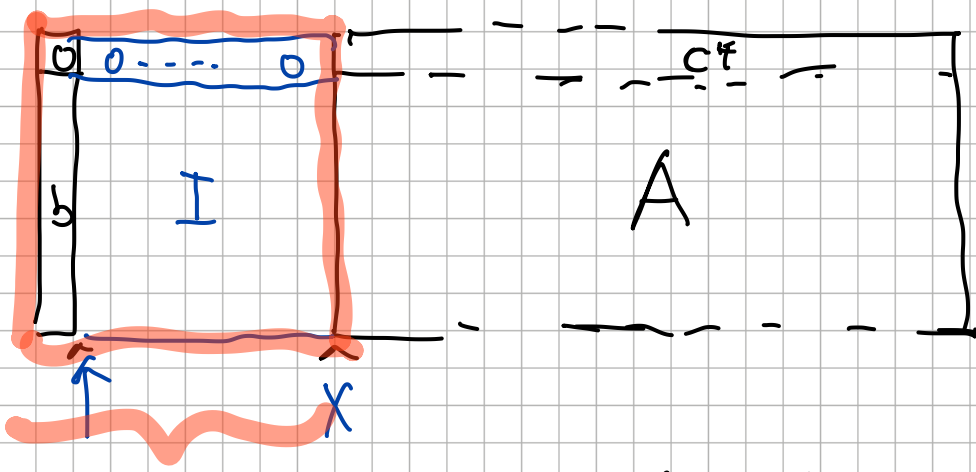
position 2715 position 2717



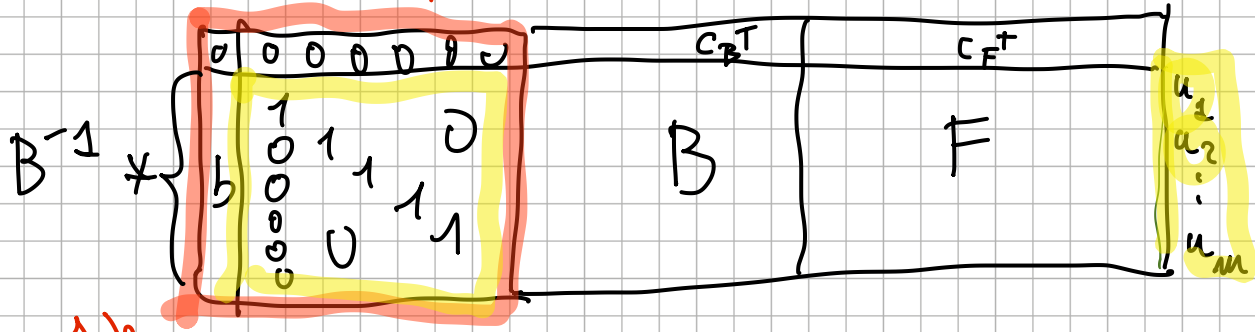
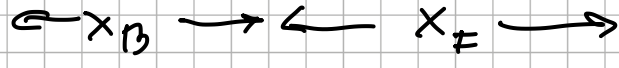
$\rightsquigarrow O(m^3)$ time



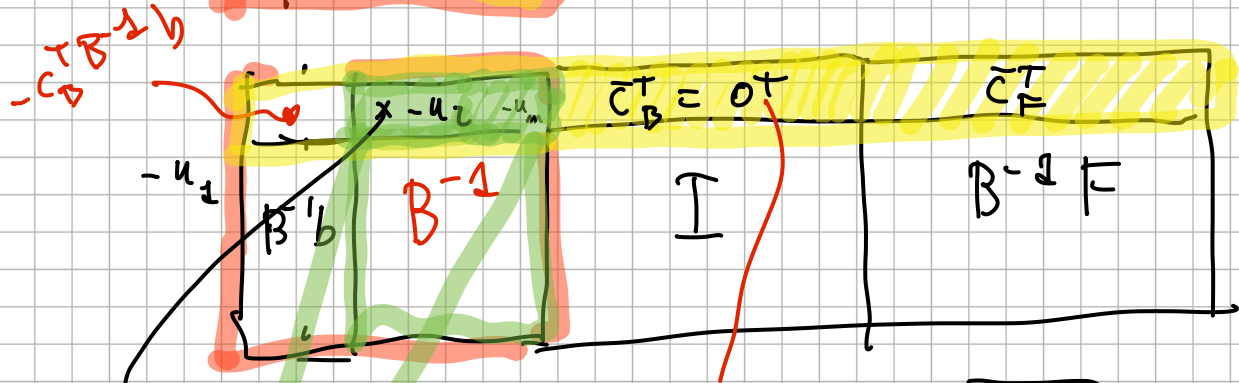
UPDATE B^{-1} during the simplex method



CARRY



original tableau



canonic. w.r.t. current B

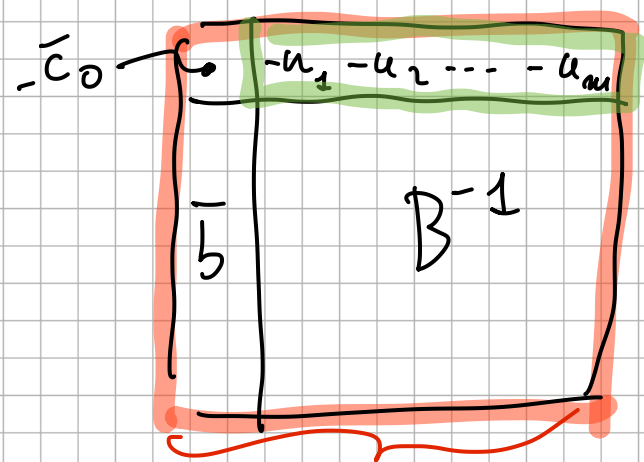
$$\bar{c}^T = c^T - u^T A$$

where

$$u^T = -c_B^T B^{-1}$$

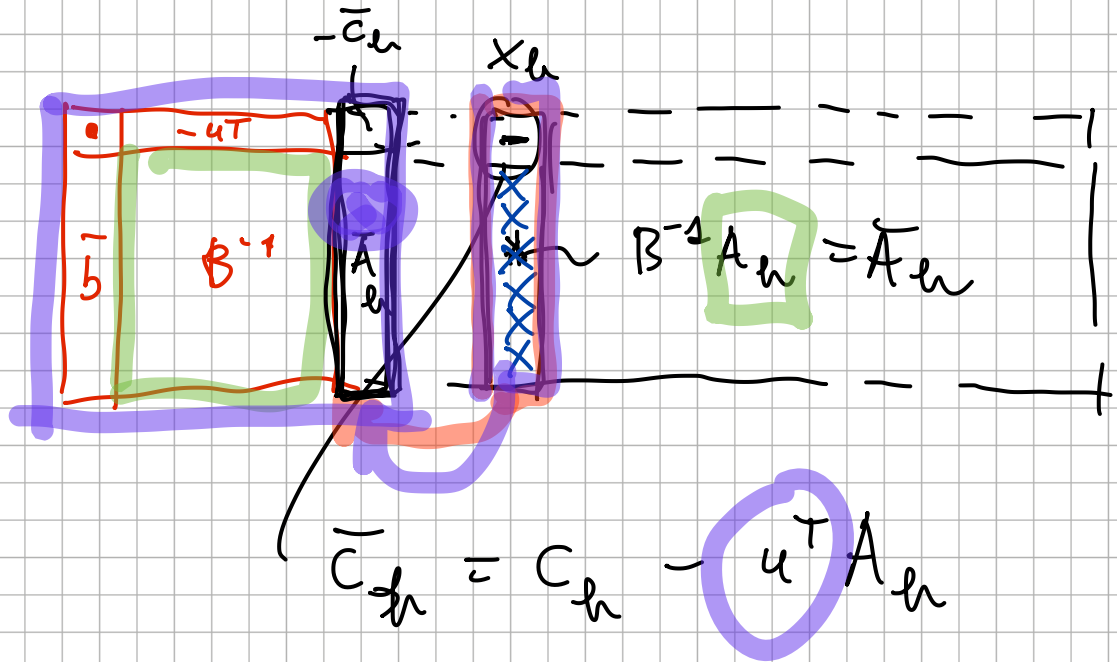
$$0 - u_1$$

$$-u^T$$



CARRY

$$\bar{b} = B^{-1}b$$



$\bar{c}_h < 0 \Rightarrow$ GENERATE THE CORRESP. TABLEAU ROW "ON THE FLY"

BOUNDED VAR.S

$$0 \leq x_j \leq q_j$$

q_j is a given UPPER BOUND on x_j

" $lb_j \leq x_j \leq ub_j$ " $\rightarrow x'_j = x_j - lb_j$

upper bounds dealt with in an IMPLICIT way

$$A = [B \mid \underbrace{L \mid U}_F \text{ nonbasic vars.}]$$

$$\left. \begin{array}{l} L = \text{lower bound} \\ U = \text{upper bound} \end{array} \right\} \text{NON BASIC vars.}$$

basic sol. associated $[B \mid L \mid U]$

$$\left\{ \begin{array}{l} x_L = 0 \quad \text{as usual} \\ x_U = q_U \\ x_B = B^{-1} (b - U q_U) \end{array} \right.$$

$$Ax = Bx_B + Lx_L + Ux_U = b$$

$$Bx_B = b - \underbrace{Lx_L}_{=0} - \underbrace{Ux_U}_{=q_U}$$

$$x_B = B^{-1} (b - U q_U)$$

$$\bar{c}^T = c^T - c_B^T B^{-1} A$$

"as usual"

OPTIMALITY TEST

$$\bar{c}_h \geq 0$$

NO INCENTIVE in changing the basis, for every x_h nonbasic at the lower bound

$$\bar{c}_h \leq 0$$

NO INCENTIVE to change the basis for every x_h nonbasic at the upper bound

• $\bar{c}_h < 0$ for x_h nonbasic at L.B

$\rightarrow x_h \rightarrow d_h = \text{***} \geq 0$

• $\bar{c}_h > 0$ for $x_h = q_h$ nonbasic at U.B.

$x_h \rightarrow q_h + d_h$, with $d_h \leq 0$

$d_h = \text{***}$

*** NEW FORMULAS FOR d_h