CAO 19.12.17

We continue our Simplex-Algorithm example from last time:

Previous tableau:

$$\begin{aligned} x_3 &= 3 - x_1 - 3x_2 \\ x_4 &= 3 - 3x_1 - x_2 \\ \xi &= x_1 + x_2 \\ & x_1, x_2, x_3, x_4 \geq 0 \end{aligned} \qquad (1)$$

What happened: x_1 enters the basis
x_4 leaves the basis

Use "$\rightarrow$" to obtain equation for x_1:

$$x_1 = 1 - \frac{1}{3}x_2 - \frac{1}{3}x_4$$

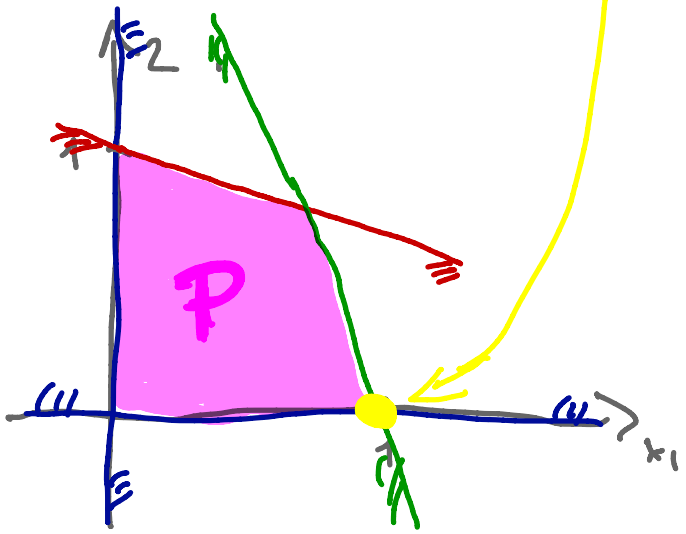
Replace x_1 in "$\rightarrow$":

$$x_3 = 3 - \left(1 - \frac{1}{3}x_2 - \frac{1}{3}x_4\right) - 3x_2 = 2 - \frac{8}{3}x_2 + \frac{1}{3}x_4$$

$$\xi = 1 - \frac{1}{3}x_2 - \frac{1}{3}x_4 + x_2 = 1 + \frac{2}{3}x_2 - \frac{1}{3}x_4$$

$$
\begin{aligned}
x_1 &= 1 - \tfrac{1}{3}x_2 - \tfrac{1}{3}x_4 \\
x_3 &= 2 - \tfrac{8}{3}x_2 + \tfrac{1}{3}x_4 \\
\xi &= 1 + \tfrac{2}{3}x_2 - \tfrac{1}{3}x_4
\end{aligned}
\qquad (2)
$$

Basic solution : $x^{(2)} = (1, 0, 2, 0), \xi = 1$



x_2 has positive reduced cost $\left(\frac{2}{3}\right)$

ratio test for x_2 :

x_1 : $1 \Big/ \left|-\frac{1}{3}\right| = 3$

x_3 : $2 \Big/ \left|-\frac{8}{3}\right| = \frac{6}{8} = \frac{3}{4}$ ←

x_2 enters
x_3 leaves

$$x_1 = 1 - \frac{1}{3}x_2 - \frac{1}{3}x_4$$
$$\rightarrow \quad x_3 = 2 - \frac{8}{3}x_2 + \frac{1}{3}x_4$$
$$\xi = 1 + \frac{2}{3}x_2 - \frac{1}{3}x_4$$

$\begin{pmatrix} x_2 & \text{entre} \\ x_3 & \text{sale} \end{pmatrix}$

$$x_2 = \frac{3}{4} - \frac{3}{8}x_3 + \frac{1}{8}x_4$$
$$x_1 = \frac{3}{4} + \frac{1}{8}x_3 - \frac{3}{8}x_4 \qquad (3)$$
$$\xi = \frac{3}{2} - \frac{1}{4}x_3 - \frac{1}{4}x_4$$

Base solution: $x^{(3)} = \left(\frac{3}{4}, \frac{3}{4}, 0, 0\right)$, $\xi = \frac{3}{2}$