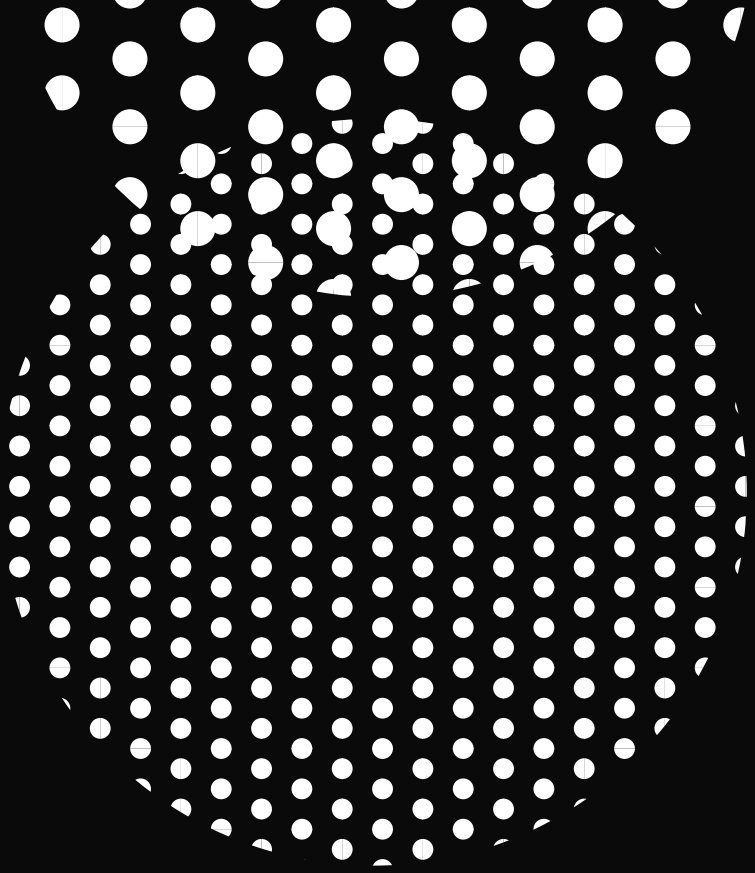


Exercice 1

1. $\mathcal{U} = 5x_1 + 4x_2$

$$\begin{cases} x_1 + x_2 + s_1 = 5 \\ 10x_1 + 6x_2 + s_2 = 45 \\ x_1 - s_3 + s_4 = 4 \end{cases} \Leftrightarrow \begin{cases} x_1 + x_2 + s_1 = 5 \\ 10x_1 + 6x_2 + s_2 = 45 \\ s_4 = 4 + s_3 - x_1 \end{cases}$$

	x_1	x_2	s_1	s_2	s_3	s_4	
Δ	1	0	0	0	-1	0	4
s_1	1	1	1	0	0	0	5
s_2	10	6	0	1	0	0	45
s_4	1	0	0	0	-1	1	4
Δ_2	5	4	0	0	0	0	0

	x_1	x_2	s_1	s_2	s_3	s_4	
Δ	0	0	0	0	0	-1	0
s_1	0	1	1	0	1	-1	1
s_2	0	6	0	1	10	-10	5
x_1	1	0	0	0	-1	1	4
Δ_2	0	4	0	0	5	-5	-20

$(x_1, s_1, s_2) = (4, 1, 5)$

$(x_1, x_2, s_1, s_2, s_3) = (4, 0, 1, 5, 0)$

	x_1	x_2	s_1	s_2	s_3		
s_1	0	$\frac{2}{5}$	1	$-\frac{1}{10}$	0		$\frac{1}{2}$
s_3	0	$\frac{3}{5}$	0	$\frac{1}{10}$	1		$\frac{1}{2}$
x_1	1	$\frac{3}{5}$	0	$\frac{1}{10}$	0		$\frac{5}{2}$
Δ_2	0	1	0	$-\frac{1}{2}$	0	+	$-\frac{45}{2}$

	x_1	x_2	s_1	s_2	s_3		
s_1	0	0	1	$-\frac{1}{6}$	$-\frac{2}{3}$		$\frac{1}{6}$
x_2	0	1	0	$\frac{1}{6}$	1		$\frac{5}{6}$
x_1	1	0	0	0	-1		4
Δ_2	0	0	0	$-\frac{1}{3}$	$-\frac{5}{3}$	+	$-\frac{80}{3}$

vars hors base $= 0$

$$\frac{1}{10} - \frac{3}{5 \cdot 6} = \frac{1}{16} - \frac{1}{10}$$

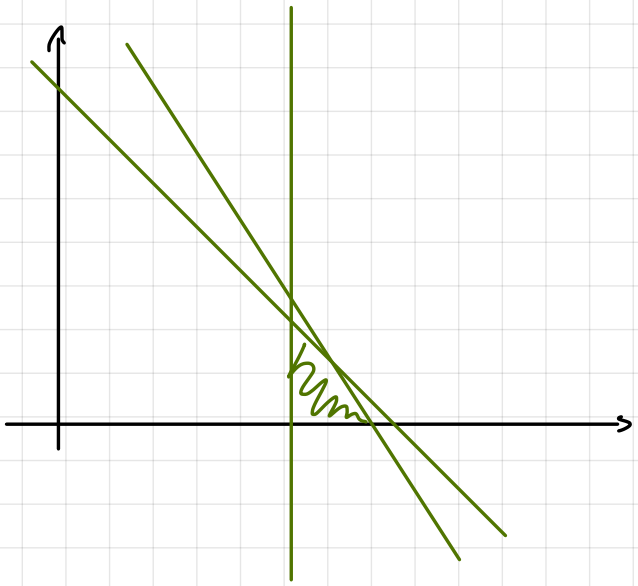
$$\frac{9}{2} - \frac{5}{3} \cdot \frac{5}{6}$$

$$\frac{9}{2} - \frac{25}{18}$$

$$\frac{81 - 25}{18} = \frac{56}{18} = \frac{28}{9}$$

$\left(x_1 = 4, x_2 = \frac{5}{6}\right)$

2.



3.

Partie B

$$\text{Max } f(x_1, x_2) = 5x_1 + 4x_2$$

$$x_1 + x_2 \leq 5$$
$$10x_1 + 6x_2 \leq 45$$

$Z_A = \frac{95}{4}$ $\quad Z_L = 19$

↙ $x_1 \leq 3$ $\quad$ ↘ $x_1 \geq 4$

$x_1 = 3 \quad x_2 = 2$ $\quad x_1 = 4 \quad x_2 = \frac{5}{6}$

$f(3,1) = 23 = Z_L = Z_C$ $\quad Z_C = \frac{70}{3}$

$Z_L = 20$

↙ $x_2 \leq 0$ $\quad$ ↘ $x_2 \geq 1$ impossible

$Z_L = 20$