Parte 2 - Resolvendo Modelos

→ Solução gráfica: até 3 variáveis

A) (MAX) $Z = 3x1 + 5x2$

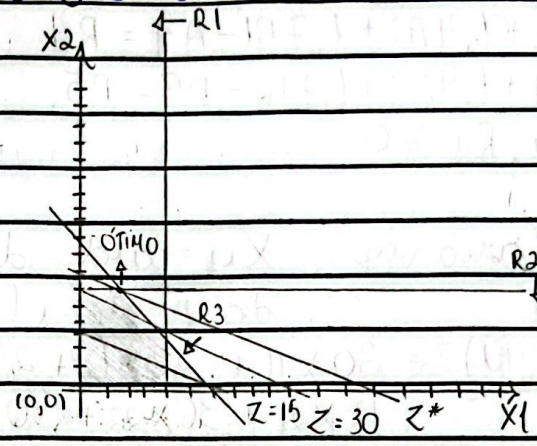
$x1 \leq 4$

$2x2 \leq 12$

$3x1 + 2x2 \leq 18$

$x1 \geq 0$

$x2 \geq 0$



B) (MAX) $Z = 2x1 + x2$

$x2 \leq 10$

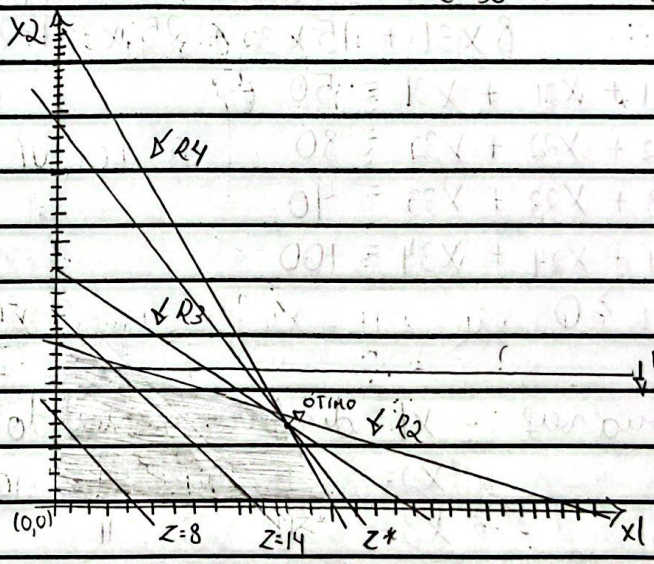
$2x1 + 5x2 \leq 60$

$x1 + x2 \leq 18$

$3x1 + x2 \leq 44$

$x1 \geq 0$

$x2 \geq 0$



C) (MIN) $Z = -4x1 - 2x2$

$x1 + x2 \leq 8$

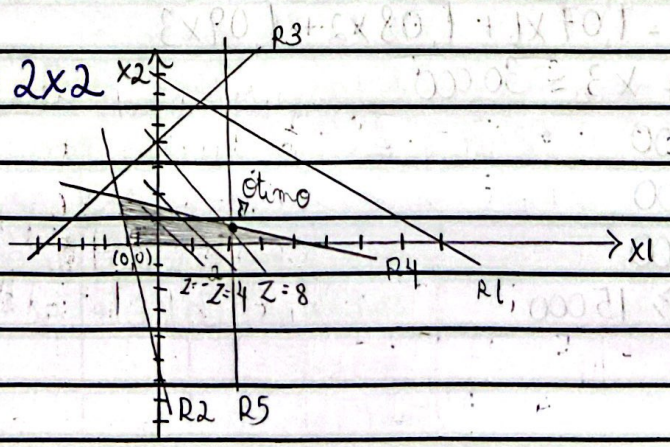
$8x1 + 3x2 \geq -24$

$-6x1 + 8x2 \leq 48$

$3x1 + 5x2 \leq 15$

$x2 \geq 0$

$x1 \leq 3$



1-) (MAX) $Z = 3x1 + 2x2$

$2x1 + 4x2 \leq 22$

$-x1 + 4x2 \leq 10$

$2x1 - x2 \leq 7$

$x1 - 3x2 \leq 1$

$x1, x2 \geq 0$

Passo 1

$2x1 + 4x2 + F1 = 22$

$-x1 + 4x2 + F2 = 10$

$2x1 - x2 + F3 = 7$

$x1 - 3x2 + F4 = 1$

$F1 = 22 - 2x1 = 11$

$F2 = 10 + x1 = \infty$

$F3 = 7 - 2x1 = 3,5$

$F4 = 1 - x1 = 1$

VB { F1 = 22, F2 = 10, F3 = 7, F4 = 1 }

VNB { x1 = 0, x2 = 0 }

Passo 2

VB { F1, F2, F3, x1 }

VNB { x2 = 0, F4 = 0 }

$Z = 11x^2 + 3F4 + 3$

$10x^2 + F1 - 2F4 = 20$

$x2 + F2 + F4 = 11$

$F3x^2 + F3 - 2F4 = 3,5$

$x1 - 3x2 + F4 = 1$

$Z = 3$

$Z - 3x1 - 2x2 = 0$

$3x1 - 5x2 + 3F4 = 3$

$Z - 11x2 + 3F4 = 3$

Eliminando x1

$2x1 - x2 + F3 = 7$ ← E3

$-2x1 + 6x2 - 2F4 = -2$ ← E4 + -2

$5x2 + F3 - 2F4 = 5$

$2x1 + 4x2 + F1 = 22$ ← E1

$-2x1 + 6x2 + 2F4 = -2$ ← E4 -2

$10x^2 + F1 + 2F4 = 20$

$-x1 + 4x2 + F2 = 10$ ← E2

$x1 - 3x^2 + F4 = 1$ ← E4

$x^2 + F2 + F4 = 11$

VB { F1, F2, X2, X1 } VNB { F3, F4 }

F1 = 20 − 10x2 = 2
F2 = 11 − x2 = 11
F3 = 5 − 5x2 = 1
F4 = 1 + 3x2 = ∞

(EP) Z − 11x2 + 3F4 = 3
(F1) 10x2 + F1 − 2F4 = 20
(F2) x2 + F2 + F4 = 11
(F3) 5x2 + F3 − 2F4 = 5
(F4) x2 − 3x2 + F4 = 1

(F3) → x2/5 + F3/5 − 2F4/5 = 1

Z − 11x2 + 3F4 = 3 ← EP
11x2 − 11F3/5 + 22F4/5 = 11 ← F3 · 11
Z + 11F1/5 − 7F4/5 = 14 ← EP

10x2 + F1 − 2F4 = 20 ← F1
−10x2 − 2F3 + 4F4 = −10 ← F5 · 10
F1 − 2F3 + 2F4 = 10 ← F1

x2 + F2 + F4 = 11 ← F2
−x2 − F3 + 2F4 = −1 ← F3 · −1
F2 − F3 + 7F4 = 10

VB { F1 = 10, F2 = 10, x2 = 1, x1 = 4 } VNB { F3 = 2, F4 = 0 }

(EP) Z + 11F3/5 − 7F4/5 = 14
(F1) F1 − 2F3 + 2F4 = 10
(F2) F2 − F3/5 + 7F4/5 = 10
(F3) x2 − F3/5 − 2F4/5 = 1
(F4) x1 + 3F3/5 − F4/5 = 4

F1/2 − F3 + F4 = 5 ← F1/2

x1 − 3x2 + F4 = 1 ← E4
3x2 + 3F3/5 − 6F4/5 = 3 ← E3 · 3
x1 + 3F3/5 − F4/5 = 4 ← E4

F1 = 10 − 2F4 5
F2 = 10 − 7F4/5 7, 14
x2 = 1 + 2F4/5 ∞
x1 = 4 + F4/5 ∞

(MAx) $Z = 21 - \frac{7F1}{10} - \frac{4F3}{10}$

VB { $F4 = 5$, $F2 = 3$, $X2 = 3$, $X1 = 5$ }

VNB { $F1 = 0$, $F3 = 0$ }

$Z + \frac{11F3}{5} - \frac{7F4}{5} = 14$ ← EP

$F2 - F3 + \frac{7F4}{5} = 10$ ← E2

$\frac{7F1}{10} - \frac{7F3}{5} + \frac{7F4}{5} = 7$ ← E1 · 1/5

$-\frac{7F1}{10} + \frac{7F3}{5} - \frac{7F4}{5} = -7$ ← E1 · $-\frac{7}{5}$

$Z + \frac{7F1}{10} + \frac{4F3}{5} = 21$ ← EP

$F2 - \frac{7F1}{10} + \frac{6F3}{5} = 3$ ← E2

$X2 + \frac{F3}{5} - \frac{2F4}{5} = 1$ ← E3

$X1 + \frac{3F3}{5} - \frac{F4}{5} = 4$ ← E4

$\frac{F1}{5} - \frac{2F3}{5} + \frac{2F4}{5} = 2$ ← E1 · 2/5

$\frac{F1}{10} - \frac{F3}{5} + \frac{F4}{5} = 1$ ← E1 · $-\frac{7}{5}$

$X2 + \frac{F1}{5} - \frac{F3}{5} = 3$ ← E3

$X1 + \frac{F1}{10} + \frac{2F3}{5} = 5$ ← E4

(2) (MAx) $Z = 4x1 + 3x2 + 6x3$

$3x1 + x2 + 3x3 \leq 30$ $\quad 3x1 + x2 + 3x3 + x4 = 30$

$2x1 + 2x2 + 3x3 \leq 40$ $\quad 2x1 + 2x2 + 3x3 + x5 = 40$

$x1 \geq 0$

	x1	x2	x3	x4	x5		
x4	3	1	3	1	0	10	x1 = 10
x5	2	2	3	0	1	13	x2 = 10
							x3 = 20/3
x3	1	0	1	0	0	30	Z = 70
x6	-1	1	0	-1	1	10	

x3	1	0	1	0	0
x2	-1	1	0	-1	1

③ (MAX) $Z = 2x1 - x2 + x3$

$3x1 + x2 + x3 \leq 60$ $\quad 3x1 + x2 + x3 + x4 = 60$

$x1 + x2 + 2x3 \leq 10$ $\quad x1 + x2 + 2x3 + x5 = 70$

$x1 + x2 - x3 \leq 20$ $\quad x1 + x2 - x3 = 20$

$x1 \geq 0$

	x1	x2	x3	x4	x5	x6	
x4	3	1	1	1	0	0	20
x5	1	-1	2	0	1	0	10
x6	1	1	-1	0	0	1	20
x4	0	4	-5	1	-3	0	7
x5	1	-1	2	0	1	0	-10
x6	0	2	-3	0	-1	1	5
x4	0	0	1	-1	-1	-2	
x5	1	0	0	0	0	0,5	
x6	0	1	-1	0	-0,5	0,5	

$x1 = 15$

$x2 = 5$

$x3 = 0$

$Z = 25$