1. $Máx\ Z = x + 3y$
s.a.
$r1: 3x + 8y \leq 50$
$r2: x + 2y \geq 15$
$r3: 2x + 3y \leq 100$
$r4: x \geq 0$
$r5\ y \geq 0$

$r_1: 3x + 8y + h_1 = 50$
$r_2: -x - 2y + h_2 = -15$
$r_3: 2x + 3y + h_3 = 100$
$Z_j: x + 3y + 0h_1 + 0h_2 + 0h_3$

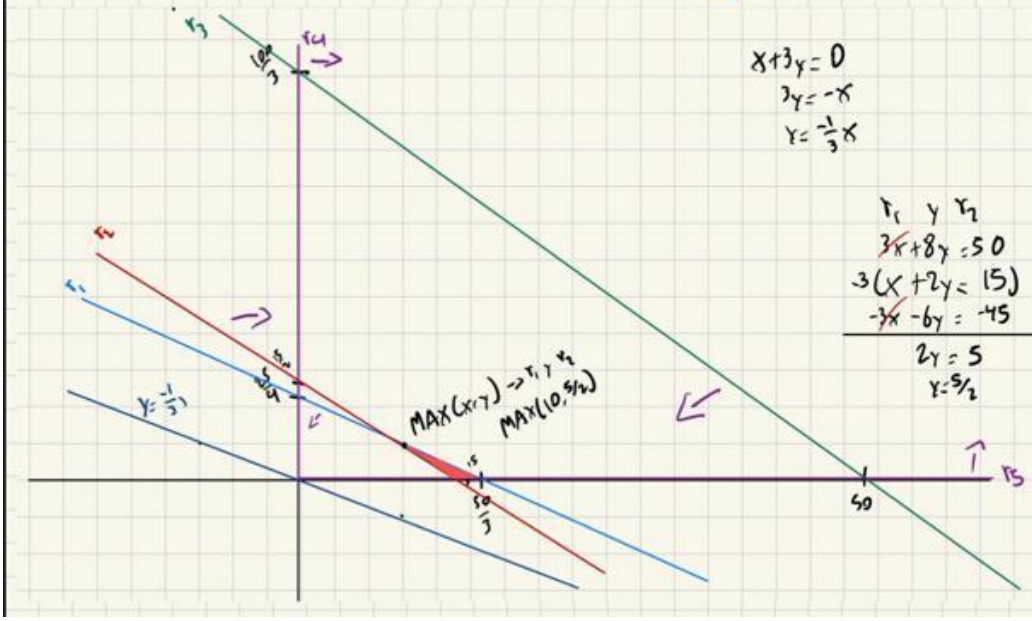
∴ $x = 10,\ y = 5/2$
$h_1 = 0,\ h_2 = 0$
$h_3 = 145/2$
$Z_j = 35/2$
$MAX(x,y) = (10, 5/2)$

	1	3	0	0	0		
C_j	x	y	h_1	h_2	h_3		
h_1 0	3	8	1	0	0	50	
h_2 0	-1	-2	0	1	0	-15	
h_3 0	2	3	0	0	1	100	
Z_j	0	0	0	0	0	0	
$C_j - Z_j$	1	3	0	0	0		
h_1 0	0	2	1	3	0	5	$5/2$ $h_1 - 3x$
x 1	1	2	0	-1	0	15	$15/2$ $(h_2)(-1)$
h_3 0	0	-1	0	2	1	70	-30 $h_3 - 2x$
Z_j	1	2	0	-1	0	15	
$C_j - Z_j$	0	1	0	1	0		
y 3	0	1	1/2	3/2	0	5/2	$h_1(1/2)$
x 1	1	0	-1	-4	0	10	$x - 2y$
h_3 0	0	0	1/2	7/2	1	145/2	$h_3 + y$
Z_j	1	3	1/2	1/2	0	35/2	
$C_j - Z_j$	0	0	-1/2	-1/2	0		

Volvemos a usar v2.0

→ NO HAY MÁS POSITIVO

$r_1: 3x + 8y + h_1 = 50 \rightarrow 3(10) + 8(5/2) + 0 = 30 + 20 = 50$
$r_2: -x - 2y + h_2 = -15 \rightarrow -10 - 2(5/2) + 0 = -10 - 5 = -15$
$r_3: 2x + 3y + h_3 = 100 \rightarrow 2(10) + 3(5/2) + \frac{145}{2} = 20 + \frac{15}{2} + \frac{145}{2} = 20 + 80 = 100$
$Z_j: x + 3y + 0h_1 + 0h_2 + 0h_3 \rightarrow 10 + 3(5/2) + 0 + 0 + 0 = 10 + \frac{15}{2} = \frac{35}{2}$



$x + 3y = 0$
$2y = -x$
$y = -\frac{1}{3}x$

r_1 y r_2
$3x + 8y = 50$
$-3(x + 2y = 15)$
$-3x - 6y = -45$
$2y = 5$
$y = 5/2$

$x + 2(\frac{5}{2}) = 15$
$x = 15 - 5$
$x = 10$

V.3.0

2: Min $Z = a + 2b + c$

S.a

$r_1 = 3a + 3b + 3c \geq 40 \rightarrow -3a - 3b - 3c \leq -40$

$r_2 = b - c \leq 20 \quad b - c \leq 20$

$r_3 = a + 2b + 3c \geq 50 \quad -a - 2b - 3c \leq -50$

$r_4 = a \geq 10 \quad -a \leq -10$

$r_5 = b, c \geq 0$

① $-3a - 3b - 3c + h_1 = -40$

② $b - c + h_2 = 20$

③ $-a - 2b - 3c + h_3 = -50$

④ $-a + h_4 = -10$

$Z = a + 2b + c + 0h_1 + 0h_2 + 0h_3 + 0h_4$

C_j	1	2	1	0	0	0	0	
	a	b	c	h_1	h_2	h_3	h_4	
h_1°	-3	-3	-3	1	0	0	0	-40
h_2°	0	1	-1	0	1	0	0	20
h_3°	-1	-2	-3	0	0	1	0	-50
h_4°	-1	0	0	0	0	0	1	-10
Z_j	0	0	0	0	0	0	0	0
$C_j - Z_j$	1^{-1}	2^{-1}	$1^{-1/3}$	0	0	0	0	
	1	2	1	0	0	0	0	
$3c + h_1$°	-2	-1	0	1	0	-1	0	10
$c + h_2$°	1/3	1/3	0	0	1	-1/3	0	110/3
c	1/3	2/3	1	0	0	-1/3	0	50/3
h_4°	-1	0	0	0	0	0	1	-10
Z_j	1/3	2/3	1	0	0	-1/3	0	50/3
$C_j - Z_j$	$2/3^{-2/3}$	$4/3^{0}$	0^{0}	0	0	$1/3^{0}$	0	
	0	1	0	1	0	0	0	
$2a\ h_1$°	0	-1	0	1	0	-1	-2	30
$-1/3a\ h_2$°	0	1/3	0	0	1	-1/3	1/3	100/3
$-1/3a$ c	0	2/3	1	0	0	-1/3	1/3	40/3
a	1	0	0	0	0	0	-1	10
Z_j	1	2/3	1	0	0	-1/3	-2/3	70/3
$C_j - Z_j$	0	4/3	0	0	0	1/3	2/3	

$a = 10$ $\quad h_1 = 30$

$b = 0$ $\quad h_2 = 100/3$ ✓

$c = 40/3$ $\quad h_3 = 0$

$h_4 = 0$

Resultados con V. 2.0

$a = 10$ $\quad h_1 = 30$ $\quad A_1 = 0$
$b = 0$ $\quad h_2 = 100/3$ $\quad A_2 = 0$
$c = 40/3$ $\quad h_3 = 0$ $\quad A_3 = 0$
$\quad h_4 = 0$

$3a + 3b + 3c - h_1 + A_1 = 40 \rightarrow 3(10) + 3(0) + 3(40/3) - 30 + \emptyset$
$30 + 0 + 40 - 30 = 40$ ✓

$b - c + h_2 = 20 \rightarrow (0) - 40/3 + \frac{100}{3} = \frac{60}{3} = 20$ ✓

$a + 2b + 3c - h_3 + A_2 = 50 \rightarrow (10) + 2(0) + 3(40/3) - \emptyset + \emptyset$
$10 + 0 + 40 = 50$ ✓

$a - h_4 + A_3 = 10 \rightarrow (10) - \emptyset + \emptyset = 10$ ✓

Resultados con V.3.0

$a = 10$ $\quad h_1 = 30$
$b = \emptyset$ $\quad h_2 = 100/3$ ✓
$c = 40/3$ $\quad h_3 = \emptyset$
$\quad h_4 = \emptyset$

① $-3a - 3b - 3c + h_1 = -40 \rightarrow -3(10) - \emptyset - 3(40/3) + 30 = -40$ ✓
② $b - c + h_2 = 20 \rightarrow \emptyset - 40/3 + 100/3 = 20$ ✓
③ $-a - 2b - 3c + h_3 = -50 \rightarrow -10 - \emptyset - 3(40/3) + \emptyset = -50$ ✓
④ $-a + h_4 = -10 \rightarrow -10 + 0 = -10$ ✓

3. Min $z = 3h - 3i$

r_1: $2h - 2i \geq 25$ $\quad -2h + 2i \leq -25$ $\quad -2h + 2i + h_1 = -25$

r_2: $h + 2i \geq 50$ $\quad h + 2i + h_2 = 50$

r_3: $4h + 3i \geq 120$ $\quad -4h - 3i \leq -120$ $\quad -4h + 3i + h_3 = -120$

r_4: $h \geq 0$

r_5: $i \geq 0$

$z = 3h - 3i + \emptyset h_1 + \emptyset h_2 + \emptyset h_3$

		3	-3	∅	∅	∅		
	c_j	h	i	h_1	h_2	h_3		
	h_1	-2	2	1	0	0	-25	
	h_2	1	2	0	1	0	50	
	h_3	-4	-3	0	0	1	-120	
	z_j	0	0	0	0	0	0	
	$c_j - z_j$	3	-3	0	0	0		
+2h+	h_1	0	-1/2	1	0	-1/2	35	10
-h2	h_2	0	3/4	0	1	1/4	20	16
	h	1	3/4	0	0	-1/4	30	40
	z_j	3	9/4	0	0	-3/4	90	
	$c_j - z_j$	0	-21/4	0	0	3/4		
	i	0	1	2/7	0	-1/7	10	
-5/4i+	h_2	0	0	-5/14	1	3/7	15/2	
-3/4 i+	h	1	0	-3/14	0	-1/7	45/2	
	z_j	3	-3	-3/2	0	0	75/2	
	$c_j - z_j$	0	0	3/2	0	0		

$h = 45/2$ $\quad h_1 = 0$

$i = 10$ $\quad h_2 = 15/2$

$h_3 = 0$

Comprobación.

$-2(45/2) + 2(10) + \emptyset = -25$

$-25 = -25$

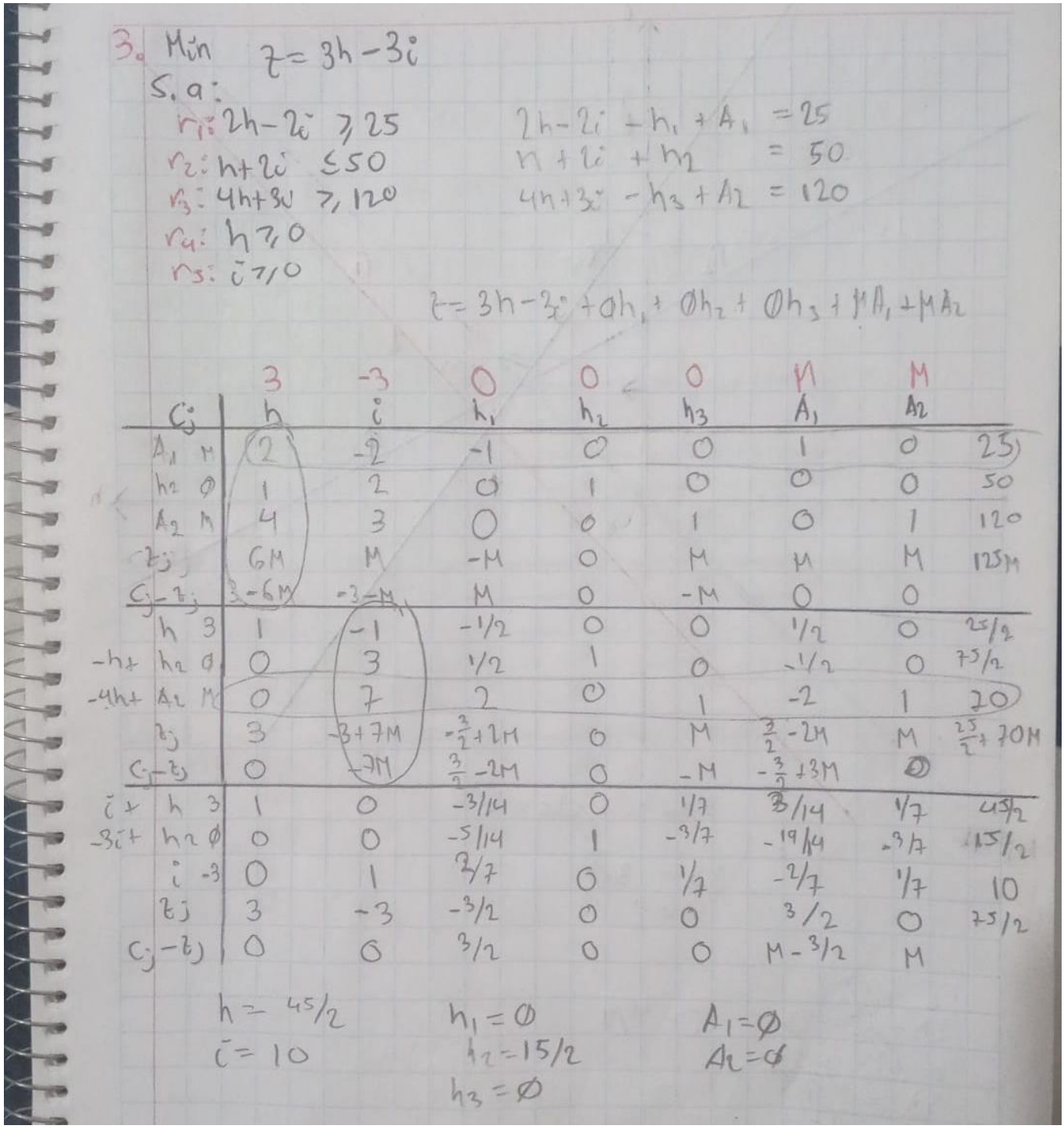
$45/2 + 2(10) + 15/2 = 50$

$30 = 50$

$-4(45/2) - 3(10) + \emptyset = -120$

$-120 = -120$

Comprobando con el método simplex versión 2.0:



3. Min $z = 3h - 3i$

S.a:

r_1: $2h - 2i \geq 25$ → $2h - 2i - h_1 + A_1 = 25$

r_2: $h + 2i \leq 50$ → $h + 2i + h_2 = 50$

r_3: $4h + 3i \geq 120$ → $4h + 3i - h_3 + A_2 = 120$

r_4: $h \geq 0$

r_5: $i \geq 0$

$z = 3h - 3i + 0h_1 + 0h_2 + 0h_3 + MA_1 + MA_2$

		3	-3	0	0	0	M	M	
C_j		h	i	h_1	h_2	h_3	A_1	A_2	
	A_1 M	2	-2	-1	0	0	1	0	25
	h_2 0	1	2	0	1	0	0	0	50
	A_2 M	4	3	0	0	1	0	1	120
	z_j	6M	M	-M	0	M	M	M	125M
	$C_j - z_j$	3-6M	-3-M	M	0	-M	0	0	
	h 3	1	-1	-1/2	0	0	1/2	0	25/2
-h+	h_2 0	0	3	1/2	1	0	-1/2	0	75/2
-4h+	A_2 M	0	7	2	0	1	-2	1	20
	z_j	3	-3+7M	$-\frac{3}{2}+2M$	0	M	$\frac{3}{2}-2M$	M	$\frac{25}{2}+70M$
	$C_j - z_j$	0	-7M	$\frac{3}{2}-2M$	0	-M	$-\frac{3}{2}+3M$	0	
i+	h 3	1	0	-3/14	0	1/7	3/14	1/7	45/2
-3i+	h_2 0	0	0	-5/14	1	-3/7	-19/14	-3/7	15/2
	i -3	0	1	3/7	0	1/7	-2/7	1/7	10
	z_j	3	-3	-3/2	0	0	3/2	0	75/2
	$C_j - z_j$	0	0	3/2	0	0	M-3/2	M	

$h = 45/2$ $\quad h_1 = 0$ $\quad A_1 = 0$

$i = 10$ $\quad h_2 = 15/2$ $\quad A_2 = 0$

$h_3 = 0$