

4) minimizer

$$m + n - 1 = 8$$

4	2	5	7	9	10
2	2	8	3	5	10
2	3	9	9	8	15
6	10	7	1	10	25
15	15	10	10	10	

(4)	10				20 0
(2)	10				10 0
(3)	5				5 20 40 50 0
	5				
6)	10	10	5	20 40 50 0	
7)	15	15	10	10	
8)	0	0	5		
9)	0	0	0		

-3		-1	-3	-2	2
0	10				
10		-3	-4	+3	.3
1				+	
5	10	-4	-10	5	3
-2	-5	10	10	5	5
-1	0	2	-4		
				5	

-3	-4	-6	-5	
70				-7
1	-6	-7		
50	(+)			50
1	1	1	1	
(+)	(-)	-7	-10	-3
70	5			0
+1	-2			
-2	10	10	15	5
2	3	2	-4	
				5

-3		-3	-5	-4	
10					0
-7		-6	-2		
5				-15	0
0	-6	-12	-2		
15					1
-3					
8	70	70	5		5
-1	2	2	-4		

$$\begin{array}{r}
 2 + 10.2 + 5.2 + 5.5 \\
 1.5.2 + 10.3 + 10.1 \\
 \hline
 2 = 21.5
 \end{array}$$

6) maximizer

$$m + n - 1 = 7$$

4	3	6	4	4	500
7	4	6	8	9	330
2	5	9	8	8	120
140	220	360	80	150	

6)	+1	+2			500 260 220 0
40	220	240			
100			80 150		330 180 100 0
		+1			
140	220	360	80	150	
	0	240	0	0	
40					
0					

40	220	240	+1	+2	0
100			+1	+2	
100	1		80	150	3
0	+1	1	0	+1	
1		1120			3
+	-	-	0		
4	3	5	6		0

solución original

$$\begin{aligned} z &= 40 \cdot 4 + 220 \cdot 3 + 240 \cdot 6 \\ &= 100 \cdot 7 + 80 \cdot 8 + 150 \cdot 9 \\ &\boxed{z = 6030} \rightarrow \text{solución original} \end{aligned}$$

0	220	280	+1	+2	0
100	+2	+3			
100			80	150	3
40	+1	0	+1		
4	3	5	6		3

solución alternativa:

$$\begin{aligned} z &= 220 \cdot 3 + 280 \cdot 6 + 100 \cdot 7 \\ &= 80 \cdot 8 + 90 \cdot 150 + 40 \cdot 7 \\ &\boxed{z = 6030} \end{aligned}$$

7) minimize

4	3	6	4	4	500
7	4	6	8	9	330
7	5	9	8	0	120
140	220	360	80	150	

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
50	220		80	150	500	280	200	500
					330	0		
20		30			120	30	0	
140	220	360	80	150				
90	0	36	0	0				
0	0							

50	220	0	80	150	0
(+) - - 0	- 1 - 1		- 4 - 5		
1	1 1	330			6
1	+ 1 1		- 1 - 1		
90	(+) 30				3
4	3	5	4	4	
6					

140	130	0	80	150	1
(+) - - 0	- 2 - 1		- 5 - 6		
1	330				0
- 1	- 1		- 2 - 2		
90	30				3
(+) - 10					
3	2	3	3	3	
6					

$$Z = 140 \cdot 4 + 130 \cdot 3 + 80 \cdot 4 + 150 \cdot 1$$

$$330 \cdot 6 + 90 \cdot 5 + 30 \cdot 9$$

$$(Z = 4590)$$

140	100	30	80	-150	0
-3	-1		-4	-5	
		330			0
-1	-1	-1	-2	-2	
4	120		4	4	
5		6			
3					

2

$$Z = 140 \cdot 4 + 100 \cdot 3 + 30 \cdot 6 \\ + 80 \cdot 4 + 150 \cdot 4 + 330 \cdot 6 \\ + 120 \cdot 5$$

$$\boxed{Z = 4540}$$

✓

10) minimizando

6

9	6	8	4	6	200	$m + n - 1 = 8$
7	5	10	5	00	300	
12	10	7	3	7	200	
10	10	8	6	4	400	
300	400	100	200	100		

6) 4)

100 100

200 100 0

3)

300

300 0

1)

200

200

0

2)

5)

2)

200

100

100

400

300

200 0

300

400

100

200 100

100

200

100

0

0 - 0

100 100

-1

2

1

100

100

-4

-2

-6

$$\begin{aligned}
 Z &= 100 \cdot 9 + 100 \cdot 6 + 300 \cdot 5 \\
 &+ 200 \cdot 3 + 200 \cdot 10 + 100 \cdot 8 \\
 &+ 100 \cdot 4
 \end{aligned}$$

-4

-5

-1

200

-5

0 0

Z = 1

200

-3

100

-1

100

2

300

5

6

3,

2

-1	-2		-4	0
200	-	2		
(+) -	--	(-)		
1	-5	1-2	-3	
100	200	1		-1
(+) -	(-)			
-5	-5	-2	1	-6
		200		-7
1				
1	-2	0		
1200	100	1	100	2
0	-	-	(+)	
8	6	6	4	2
—	—	—	—	—

Solución original:

$$z = 200 \cdot 6 + 100 \cdot 7 + 200 \cdot 5 \\ + 200 \cdot 3 + 200 \cdot 10 + 100 \cdot 8 \\ + 100 \cdot 4$$

$$\boxed{z = 6700}$$



-1	-2	0	-4	0
200+9	-	2		
	-5	-2	-7	
100+9	200-9			-1
-5	-5	-2		
		200		-7
-2				
200-9	100	9	100	2
8	6	6	4	2
—	—	—	—	—

Solución alternativa:

$$z = 200 \cdot 6 + 100 \cdot 7 + 200 \cdot 5 \\ + 200 \cdot 3 + 200 \cdot 10 + 100 \cdot 8 \\ + 100 \cdot 4$$

$$\boxed{z = 6700}$$



12) minimizando

$$m + n - 1 = 6$$

10	2	20	11	15
12	7	9	20	25
4	14	16	18	10

5 15 15 15

1)				15 0 -
3)		5)		15 10 25 10 0
2)		(4)		5 10 5 0

5 10 15 15  
0 0 0 20  
0

+3			+20	
	15	9		15
-6	-16		(5) +	
			11	
	15	11	10 4	
-25	-9		(4) -	
5			5 2	
	-13	5	16	

2

-13		-20		
	15		8	-5
-6	+4	(5) - - - - (4)		
		- - - - (1)		
	15 + 4	10 - 4	4	
	-5	-9		
5		5	2	
	7	5	16	

2

-13	-16	10	-55
5+9		10	-55
-10	-4		0
10-9	15+9		0
-5	-5	5	2
2	7	9	16

calcular auxiliares:

$$15 - (10 - 9) = \boxed{5 + 9}$$

$$2 + (10 - 7) = \boxed{10}$$

$$z = 5 \cdot 2 + 10 \cdot 11 + 10 \cdot 7 + 15 \cdot 9 \\ + 5 \cdot 4 + 5 \cdot 18$$

$$\boxed{z = 435}$$

13) minimizer

8	6	10	9	35	
9	-12	13	7	50	
14	9	16	5	40	
45	20	30	30		
				125	

$$m + n - 1 = 6$$

3)	2)				
15	20			35	15 0
4)		5)			
30		20		50	20 0

6)	1)				
10	30	45	70	0	

45	30	30	30	
30	0	10		0
0		0		

		+2	-8	
15	20	1		-2
0	-5	1	-5	
30	1	120		-1
0	-5	120		
-2	+1	10	30	2
10	30	14		

3

-2			-10	
20	15			-4
0	15			
-3	1	-5		
45	1	5		-1
-2	+3	1		
0	1	10	30	2
10	70	14		
		3		

-2			-2	-1
	10	25	2	
	-3		2	
45		5		2
-5		-3		2
	10		30	
	7	11		3

$$\begin{aligned}
 Z &= 10 \cdot 6 + 25 \cdot 10 + 45 \cdot 9 \\
 &\quad + 5 \cdot 43 + 10 \cdot 9 + 30 \cdot 5 \\
 Z &= 1020 \quad \checkmark
 \end{aligned}$$

14) minimizer

			1)
3	7	1	800
2	2	6	1500
1000	700	600	

		4)				
		200	600	800	200	0
2)	3)					$m + m - 1 = 4$
1000	500			1500	500	0
1000	300	600				
0	200	0				
0						

		4)			
		200	600	6	
(+)	(-)				
1	1		-10		
1000	1500			1	
(-)	(+)				
1	1		-5		

		1		
200		-4	600	2
800	700	-6		
7			7	
1			-1	

$$z = 200 \cdot 3 + 600 \cdot 1 + 800 \cdot 2$$

$$+ 700 \cdot 2$$

$$\boxed{z = 4200}$$