FORMULACIÓN DIRECTA

	A	B		
EST)	$6x_1$	$+ 16x_2$	$\leq$	**48000**
SOL)	$12x_1$	$+ 6x_2$	$\leq$	**42000**
PIN)	$9x_1$	$+ 9x_2$	$\leq$	**36000**

$$Z = 4x_1 + 3x_2 \Rightarrow \text{Máx}$$

$$x_1 , \quad x_2 \geq 0$$

FORMULACIÓN DUAL

EST **SOL** **PIN**

A)

B)

FORMULACIÓN DIRECTA

	A	B		
EST)	$6\,x_1$	$+\,16\,x_2$	$\leq$	**48000**
SOL)	$12\,x_1$	$+\,6\,x_2$	$\leq$	**42000**
PIN)	$9\,x_1$	$+\,9\,x_2$	$\leq$	**36000**
$Z =$	$4\,x_1$	$+\,3\,x_2$	$\Rightarrow$	**Máx**

$$x_1 \;,\quad x_2 \geq 0$$

FORMULACIÓN DUAL

	EST	SOL	PIN		
A)	$6\ y_1 +$	$12\ y_2 +$	$9\ y_3$	$\geq$	4
B)					

FORMULACIÓN DIRECTA

	A	B		
EST)	$6\,x_1 +$	$16\,x_2$	$\leq$	48000
SOL)	$12\,x_1 +$	$6\,x_2$	$\leq$	42000
PIN)	$9\,x_1 +$	$9\,x_2$	$\leq$	36000

$$Z = 4\,x_1 + 3\,x_2 \Rightarrow \text{Máx}$$

$$x_1 \,,\quad x_2 \geq 0$$

FORMULACIÓN DUAL

	EST	SOL	PIN		
A)	$6\ y_1 +$	$12\ y_2 +$	$9\ y_3$	$\geq$	4
B)	$16\ y_1 +$	$6\ y_2 +$	$9\ y_3$	$\geq$	3

$$Z = 48.000\ y_1 + 42.000\ y_2 + 36.000\ y_3 \Rightarrow \text{Mín}$$

$$y_1\ ,\quad y_2\ ,\quad y_3 \geq 0$$

FORMULACIÓN DIRECTA

	A	B		
EST)	$6\,x_1$	$+\,16\,x_2$	$\leq$	**48000**
SOL)	$12\,x_1$	$+\,6\,x_2$	$\leq$	**42000**
PIN)	$9\,x_1$	$+\,9\,x_2$	$\leq$	**36000**
$Z =$	$4\,x_1$	$+\,3\,x_2$	$\Rightarrow$	**Máx**

$$x_1 \;,\quad x_2 \geq 0$$

FORMULACIÓN DUAL

	EST	SOL	PIN		
A)	$6\ y_1 +$	$12\ y_2 +$	$9\ y_3$	$\geq$	4
B)	$16\ y_1 +$	$6\ y_2 +$	$9\ y_3$	$\geq$	3

$$Z = 48.000\ y_1 + 42.000\ y_2 + 36.000\ y_3 \Rightarrow \text{Mín}$$

FORMULACIÓN DUAL

	EST	SOL	PIN		
A)	$6\ y_1 +$	$12\ y_2 +$	$9\ y_3$	$\geq$	4
B)	$16\ y_1 +$	$6\ y_2 +$	$9\ y_3$	$\geq$	3

$$Z = 48.000\ y_1 + 42.000\ y_2 + 36.000\ y_3 \Rightarrow \text{Mín}$$

$$y_i \geq 0$$

DIRECTO

MAX: $Z = 4x_1 + 3x_2$

$$6x_1 + 16x_2 \leq 48000$$
$$12x_1 + 6x_2 \leq 42000$$
$$9x_1 + 9x_2 \leq 36000$$
$$x_i \geq 0$$

DUAL

MIN: $48.000y_1 + 42.000y_2 + 36.000y_3$

$$6y_1 + 12y_2 + 9y_3 \geq 4$$
$$16y_1 + 6y_2 + 9y_3 \geq 3$$
$$y_i \geq 0$$

EST SOL PIN A B

A) $6\ y_1 + 12\ y_2 + 9\ y_3 - y_4 = 4$

B) $16\ y_1 + 6\ y_2 + 9\ y_3 - y_5 = 3$

$$Z = 48.000\ y_1 + 42.000\ y_2 + 36.000\ y_3 \Rightarrow \text{Mín}$$

$$y_i \geq 0$$

		c_j	48000	42000	36000	0	0	M	M	
c_k	x_k	B_k	A'_1	A'_2	A'_3	A'_4	A'_5	$A'_{\mu 1}$	$A'_{\mu 2}$	b_i/a_{ij}
M	y_4	4	6	12	9	-1		1		0.6667
M	y_5	3	16	6	9		-1		1	0.1875
Z = 7 M			22M -48000	18M -42000	18M -36000	-M	-M	0	0	z_j-c_j

c_k	x_k	B_k	A'_1	A'_2	A'_3	A'_4	A'_5	$A'_{\mu 1}$	$A'_{\mu 2}$	b_i/a_{ij}
M	y_4	2.875		9.75	5.625	-1	-0.375	1	-0.375	0.2949
48000	y_1	0.1875	1	0.375	0.5625		-0.0625		0.0625	0.5
Z = 2.875 M +9000			0	9.75M -24000	5.625M -9000	-M	-0.375M +3000	0	-1.375M +3000	z_j-c_j

c_k	x_k	B_k	A'_1	A'_2	A'_3	A'_4	A'_5	$A'_{\mu 1}$	$A'_{\mu 2}$	b_i/a_{ij}
42000	y_2	0.2949		1	0.5769	-0.1026	-0.0384	0.1026	-0.375	0.5111
48000	y_1	0.0769	1		0.3462	0.0384	-0.0769	-0.0384	0.0625	0.2222
Z = 16076,92			0	0	4846.15	-2461.54	-2076.92	2466-M	-12750 -M	z_j-c_j

c_k	x_k	B_k	A'_1	A'_2	A'_3	A'_4	A'_5	$A'_{\mu 1}$	$A'_{\mu 2}$
42000	y_2	0.1667	-1.6667	1		-0.1667	0.1667	0.1667	-0.1667
36000	y_3	0.2222	2.8889		1	0.1111	-0.2222	-0.1111	0.2222
Z = 15000			-14000	0	0	-3000	-1000	3000-M	1000-M

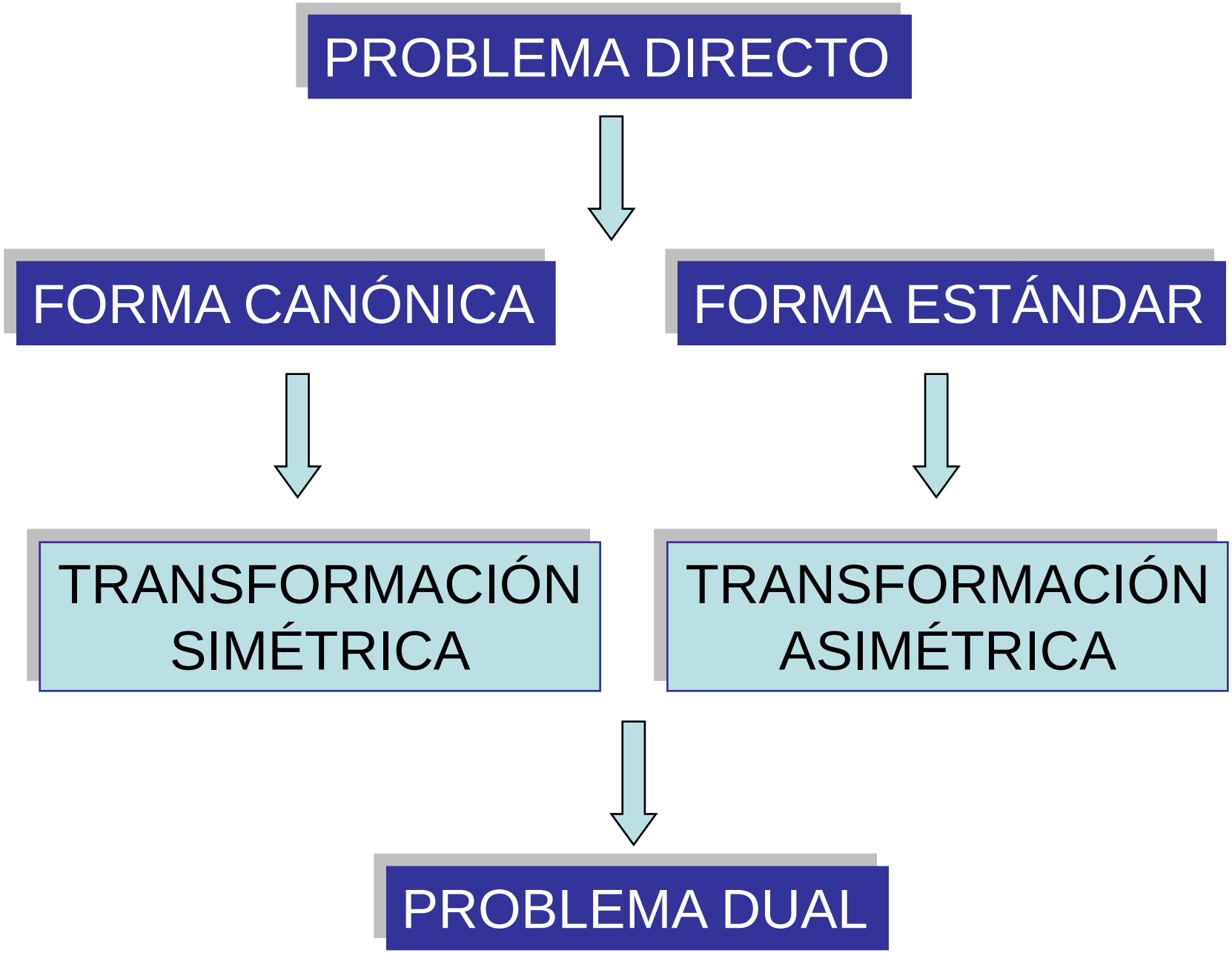
TEOREMA FUNDAMENTAL DE LA DUALIDAD

DIRECTA FINITA $\Leftrightarrow$ DUAL FINITA

$Z_{\text{ÓPTIMO DIRECTO}} = Z_{\text{ÓPTIMO DUAL}}$

DEGENERADA $\Leftrightarrow$ ALTERNATIVA

INCOMPATIBLE $\Leftrightarrow$ POL. ABIERTO


PROBLEMA DIRECTO
FORMA CANÓNICA
FORMA ESTÁNDAR
TRANSFORMACIÓN SIMÉTRICA
TRANSFORMACIÓN ASIMÉTRICA
PROBLEMA DUAL

DUAL SIMÉTRICO

DIRECTO	DUAL
$A \cdot X \leq B$ $X \geq 0$ $Z = C \cdot X \rightarrow$ Máx	

DUAL SIMÉTRICO

DIRECTO	DUAL
$A \cdot X \leq B$ $X \geq 0$ $Z = C \cdot X \rightarrow$ Máx	$A^T \cdot Y \geq C$ $Y \geq 0$ $Z = B \cdot Y \rightarrow$ Mín

DUAL SIMÉTRICO

DIRECTO	DUAL
$A \cdot X \leq B$ $X \geq 0$ $Z = C \cdot X \rightarrow$ Máx	$A^T \cdot Y \geq C$ $Y \geq 0$ $Z = B \cdot Y \rightarrow$ Mín
$A \cdot X \geq B$ $X \geq 0$ $Z = C \cdot X \rightarrow$ Mín	

DUAL SIMÉTRICO

DIRECTO	DUAL
$A \cdot X \leq B$ $X \geq 0$ $Z = C \cdot X \rightarrow$ Máx	$A^T \cdot Y \geq C$ $Y \geq 0$ $Z = B \cdot Y \rightarrow$ Mín
$A \cdot X \geq B$ $X \geq 0$ $Z = C \cdot X \rightarrow$ Mín	$A^T \cdot Y \leq C$ $Y \geq 0$ $Z = B \cdot Y \rightarrow$ Máx

DUAL ASIMÉTRICO

DIRECTO	DUAL
$A \cdot X = B$ $X \geq 0$ $Z = C \cdot X \rightarrow$ Máx	

DUAL ASIMÉTRICO

DIRECTO	DUAL
$A \cdot X = B$ $X \geq 0$ $Z = C \cdot X \rightarrow$ Máx	$A^T \cdot Y \geq C$ $Z = B \cdot Y \rightarrow$ Mín

DUAL ASIMÉTRICO

DIRECTO	DUAL
$A \cdot X = B$ $X \geq 0$ $Z = C \cdot X \rightarrow$ Máx	$A^T \cdot Y \geq C$ $Z = B \cdot Y \rightarrow$ Mín
$A \cdot X = B$ $X \geq 0$ $Z = C \cdot X \rightarrow$ Mín	

DUAL ASIMÉTRICO

DIRECTO	DUAL
$A \cdot X = B$ $X \geq 0$ $Z = C \cdot X \rightarrow$ Máx	$A^T \cdot Y \geq C$ $Z = B \cdot Y \rightarrow$ Mín
$A \cdot X = B$ $X \geq 0$ $Z = C \cdot X \rightarrow$ Mín	$A^T \cdot Y \leq C$ $Z = B \cdot Y \rightarrow$ Máx

DUAL SIMÉTRICO

MAX: $Z = 4x_1 + 3x_2 - x_3$

$$\begin{cases} 16x_1 + 6x_2 + 2x_3 \leq 480 \\ 4x_1 + 5x_2 - 7x_3 \geq 100 \\ 10x_1 + 8x_2 - 3x_3 \leq 500 \end{cases}$$

$$x_i \geq 0$$

MAX: $Z = 4x_1 + 3x_2 - x_3$

$$\begin{cases} 16x_1 + 6x_2 + 2x_3 \leq 480 \\ -4x_1 - 5x_2 + 7x_3 \leq -100 \\ 10x_1 + 8x_2 - 3x_3 \leq 500 \end{cases}$$

$$x_i \geq 0$$

DIRECTO
FORMA
CANÓNICA

$$\textbf{MAX: } Z = 4x_1 + 3x_2 - x_3$$

$$\begin{cases} 16x_1 + 6x_2 + 2x_3 \leq 480 \\ -4x_1 - 5x_2 + 7x_3 \leq -100 \\ 10x_1 + 8x_2 - 3x_3 \leq 500 \end{cases}$$

$$x_i \geq 0$$

$$\textbf{MIN: } Z = 480y_1 - 100y_2 + 500y_3$$

$$\begin{cases} 16y_1 - 4y_2 + 10y_3 \geq 4 \\ 6y_1 - 5y_2 + 8y_3 \geq 3 \\ 2y_1 + 7y_2 - 3y_3 \geq -1 \end{cases}$$

$$y_i \geq 0$$

DIRECTO

$$\text{MAX: } Z = 4x_1 + 3x_2 - x_3$$

$$\begin{cases} 16x_1 + 6x_2 + 2x_3 \leq 480 \\ 4x_1 + 5x_2 - 7x_3 \geq 100 \\ 10x_1 + 8x_2 - 3x_3 \leq 500 \end{cases}$$

$$x_i \geq 0$$

DUAL

$$\text{MIN: } Z = 480y_1 - 100y_2 + 500y_3$$

$$\begin{cases} 16y_1 - 4y_2 + 10y_3 \geq 4 \\ 6y_1 - 5y_2 + 8y_3 \geq 3 \\ -2y_1 - 7y_2 + 3y_3 \leq 1 \end{cases}$$

$$y_i \geq 0$$

MAX: $Z = 4x_1 + 3x_2 - x_3$

$$\begin{cases} 16x_1 + 6x_2 + 2x_3 \leq 480 \\ 4x_1 + 5x_2 - 7x_3 = 100 \\ 10x_1 + 8x_2 - 3x_3 \leq 500 \end{cases}$$

$$x_i \geq 0$$

MAX: $Z = 4x_1 + 3x_2 - x_3$

$$\begin{cases} 16x_1 + 6x_2 + 2x_3 \leq 480 \\ 4x_1 + 5x_2 - 7x_3 \leq 100 \\ 4x_1 + 5x_2 - 7x_3 \geq 100 \\ 10x_1 + 8x_2 - 3x_3 \leq 500 \end{cases}$$

$$x_i \geq 0$$

MAX: $Z = 4x_1 + 3x_2 - x_3$

$$\begin{cases} 16x_1 + 6x_2 + 2x_3 \leq 480 \\ 4x_1 + 5x_2 - 7x_3 \leq 100 \\ -4x_1 - 5x_2 + 7x_3 \leq -100 \\ 10x_1 + 8x_2 - 3x_3 \leq 500 \end{cases}$$

$$x_i \geq 0$$

DIRECTO
FORMA
CANÓNICA

MAX: $Z = 4\,x_1 + 3\,x_2 - x_3$

$$\begin{cases} 16\,x_1 + 6\,x_2 + 2\,x_3 \leq 480 \\ 4\,x_1 + 5\,x_2 - 7\,x_3 \leq 100 \\ -4\,x_1 - 5\,x_2 + 7\,x_3 \leq -100 \\ 10\,x_1 + 8\,x_2 - 3\,x_3 \leq 500 \end{cases}$$

$$x_i \geq 0$$

MIN: $Z = 480\,y_1 + 100\,y_2 - 100\,y_2' + 500\,y_3$

$$\begin{cases} 16\,y_1 + 4\,y_2 - 4\,y_2' + 10\,y_3 \geq 4 \\ 6\,y_1 + 5\,y_2 - 5\,y_2' + 8\,y_3 \geq 3 \\ 2\,y_1 - 7\,y_2 + 7\,y_2' - 3\,y_3 \geq -1 \end{cases}$$

$$y_i \geq 0$$

DIRECTO

MAX: $Z = 4\,x_1 + 3\,x_2 - x_3$

$$\begin{cases} 16\,x_1 + 6\,x_2 + 2\,x_3 \leq 480 \\ 4\,x_1 + 5\,x_2 - 7\,x_3 = 100 \\ 10\,x_1 + 8\,x_2 - 3\,x_3 \leq 500 \end{cases}$$

$$x_i \geq 0$$

DUAL

MIN: $Z = 480\,y_1 + 100\,y_2 - 100\,y_2' + 500\,y_3$

$$\begin{cases} 16\,y_1 + 4\,y_2 - 4\,y_2' + 10\,y_3 \geq 4 \\ 6\,y_1 + 5\,y_2 - 5\,y_2' + 8\,y_3 \geq 3 \\ -2\,y_1 + 7\,y_2 - 7\,y_2' + 3\,y_3 \leq 1 \end{cases}$$

$$y_i \geq 0$$

DUAL ASIMÉTRICO

MAX: $Z = 4x_1 + 3x_2 - x_3$

$$\begin{cases} 16x_1 + 6x_2 + 2x_3 \leq 480 \\ 4x_1 + 5x_2 - 7x_3 = 100 \\ 10x_1 + 8x_2 - 3x_3 \leq 500 \end{cases}$$

$$x_i \geq 0$$

FORMA ESTÁNDAR

MAX: $Z = 4x_1 + 3x_2 - x_3$

$$\begin{cases} 16x_1 + 6x_2 + 2x_3 + x_4 = 480 \\ 4x_1 + 5x_2 - 7x_3 = 100 \\ 10x_1 + 8x_2 - 3x_3 + x_5 = 500 \end{cases}$$

$$x_i \geq 0$$

DIRECTO

MAX: $Z = 4\,x_1 + 3\,x_2 - x_3$

$$\begin{cases} 16\,x_1 + 6\,x_2 + 2\,x_3 \leq 480 \\ 4\,x_1 + 5\,x_2 - 7\,x_3 = 100 \\ 10\,x_1 + 8\,x_2 - 3\,x_3 \leq 500 \end{cases}$$

$$x_i \geq 0$$

DUAL

MIN: $Z = 480\,y_1 + 100\,y_2 + 500\,y_3$

$$\begin{cases} 16\,y_1 + 4\,y_2 + 10\,y_3 \geq 4 \\ 6\,y_1 + 5\,y_2 + 8\,y_3 \geq 3 \\ 2\,y_1 - 7\,y_2 - 7\,3\,y_3 \geq -1 \\ y_1 \geq 0 \\ y_3 \geq 0 \end{cases}$$

PASAJE
DE TABLA ÓPTIMA DIRECTA
A TABLA ÓPTIMA DUAL

(Y VICEVERSA)

MAX: $Z = 4\,x_1 + 3\,x_2$

Sujeto a:

$$\begin{cases} 6\,x_1 + 16\,x_2 \leq 48000 \\ 12\,x_1 + 6\,x_2 \leq 42000 \\ 9\,x_1 + 9\,x_2 \leq 36000 \end{cases}$$

siendo: $x_1, x_2 \geq 0$ **y continuas**

0	x_3	14.000			1	5/3	-26/9
4	x_1	3.000	1			1/6	-1/9
3	x_2	1.000		1		-1/6	2/9
Z = 15.000			0	0	0	1/6	2/9
			y_4	y_5	y_1	y_2	y_3

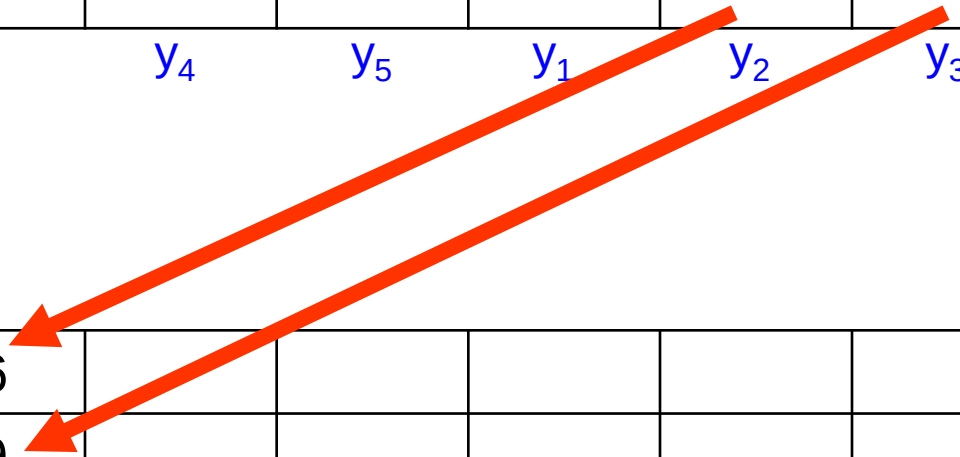
0	x_3	14.000			1	5/3	-26/9
4	x_1	3.000	1			1/6	-1/9
3	x_2	1.000		1		-1/6	2/9
Z = 15.000			0	0	0	1/6	2/9
			y_4	y_5	y_1	y_2	y_3

Z = 15.000							

0	x_3	14.000			1	5/3	-26/9
4	x_1	3.000	1			1/6	-1/9
3	x_2	1.000		1		-1/6	2/9
Z = 15.000			0	0	0	1/6	2/9
			y_4	y_5	y_1	y_2	y_3

	y_2						
	y_3						
Z = 15.000							

0	x_3	14.000			1	5/3	-26/9
4	x_1	3.000	1			1/6	-1/9
3	x_2	1.000		1		-1/6	2/9
Z = 15.000			0	0	0	1/6	2/9
			y_4	y_5	y_1	y_2	y_3



42.000	y_2	1/6					
36.000	y_3	2/9					
Z = 15.000							

0	$\mathbf{x_3}$	14.000			1	5/3	-26/9
4	$\mathbf{x_1}$	3.000	1			1/6	-1/9
3	$\mathbf{x_2}$	1.000		1		-1/6	2/9
Z = 15.000			0	0	0	1/6	2/9
			y_4	y_5	y_1	y_2	y_3

42.000	$\mathbf{y_2}$	1/6		1			
36.000	$\mathbf{y_3}$	2/9			1		
Z = 15.000				0	0		
			x_3	x_4	x_5	x_1	x_2

0	x_3	14.000			1	5/3	-26/9
4	x_1	3.000	1			1/6	-1/9
3	x_2	1.000		1		-1/6	2/9
Z = 15.000			0	0	0	1/6	2/9
			y_4	y_5	y_1	y_2	y_3

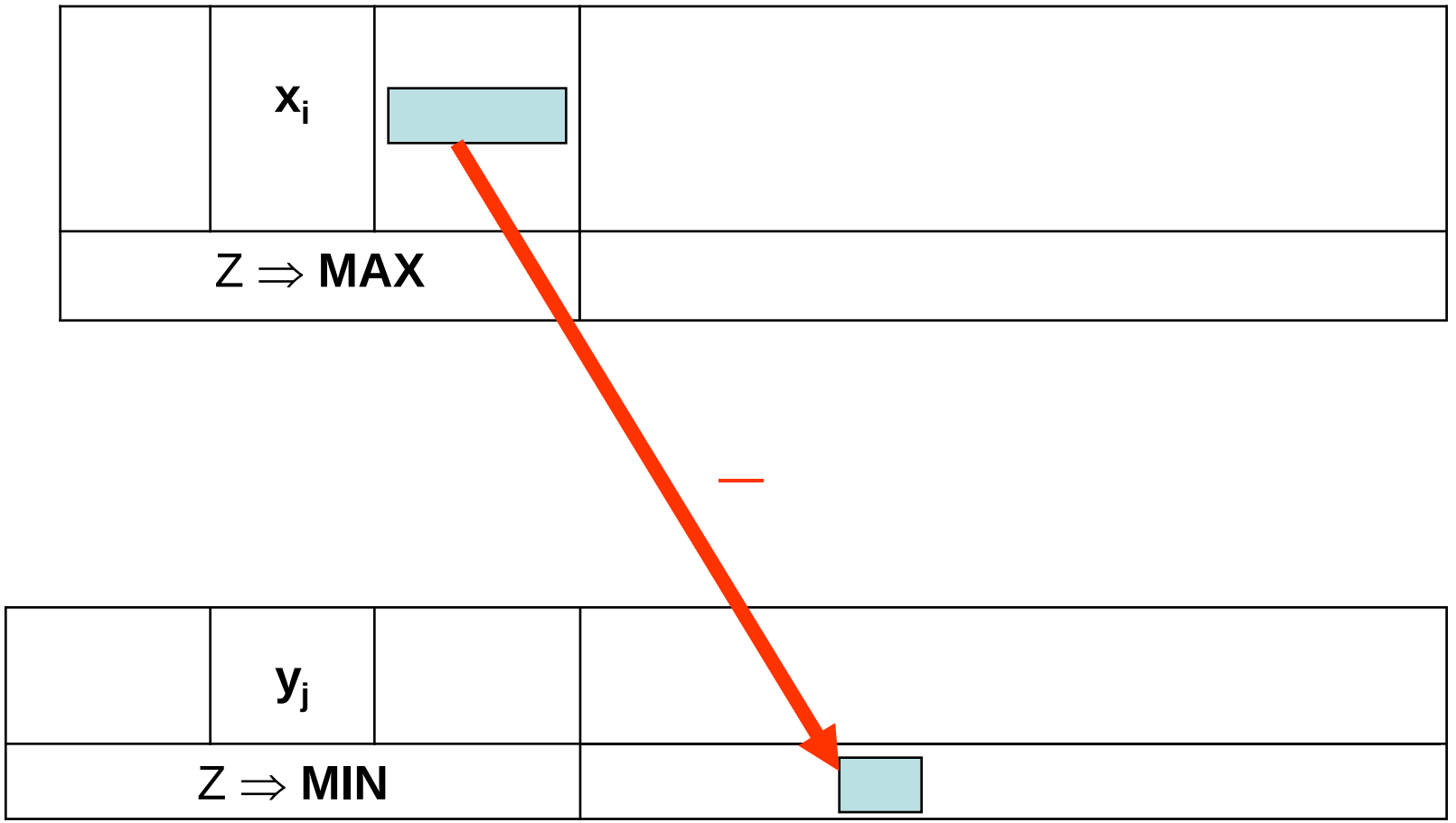
42.000	y_2	1/6	-5/3	1		-1/6	
36.000	y_3	2/9	26/9		1		
Z = 15.000				0	0		
			x_3	x_4	x_5	x_1	x_2

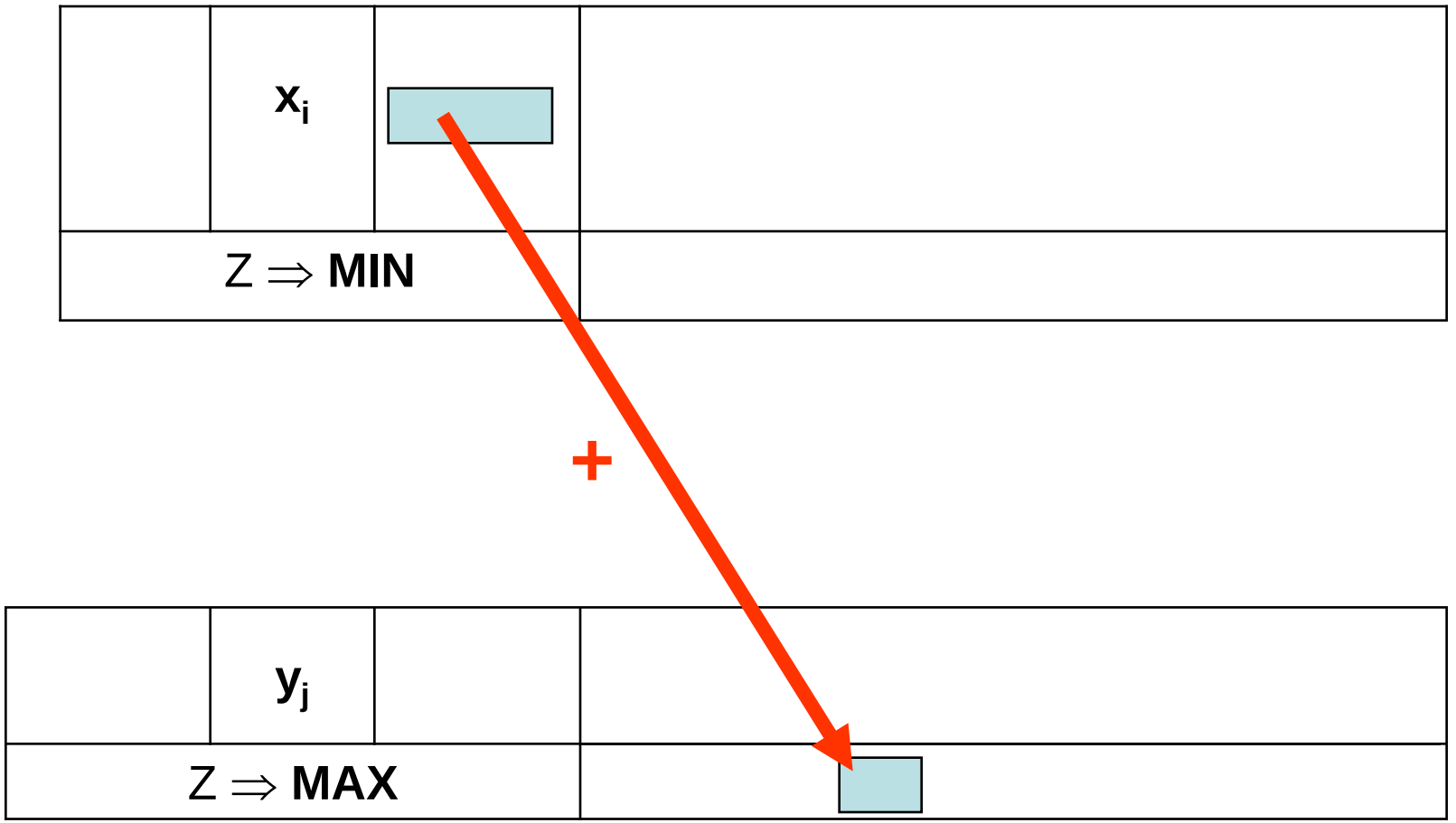
0	x_3	14.000			1	5/3	-26/9
4	x_1	3.000	1			1/6	-1/9
3	x_2	1.000		1		-1/6	2/9
Z = 15.000			0	0	0	1/6	2/9
			y_4	y_5	y_1	y_2	y_3

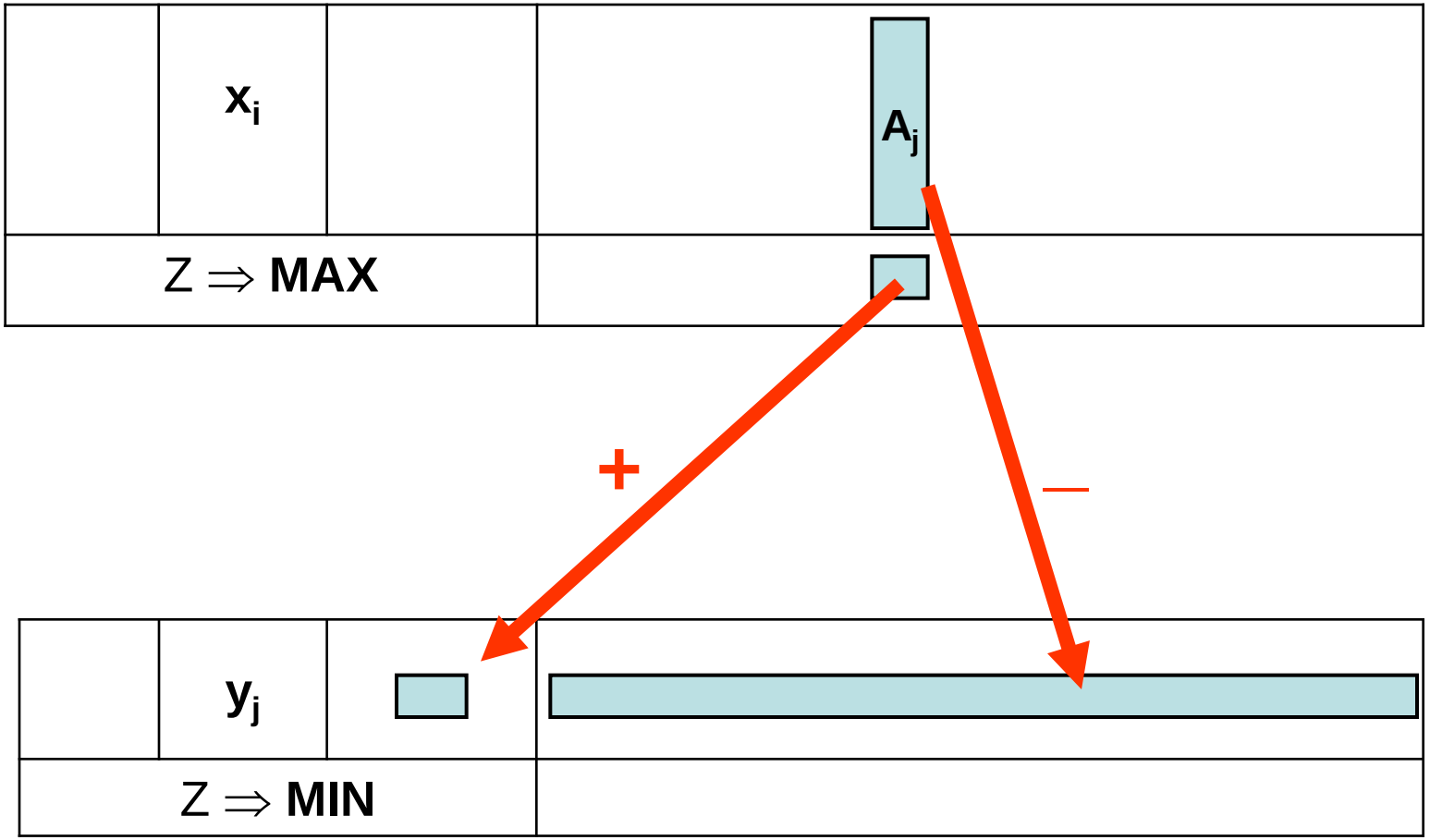
42.000	y_2	1/6	-5/3	1		-1/6	1/6
36.000	y_3	2/9	26/9		1	1/9	-2/9
Z = 15.000				0	0		
			x_3	x_4	x_5	x_1	x_2

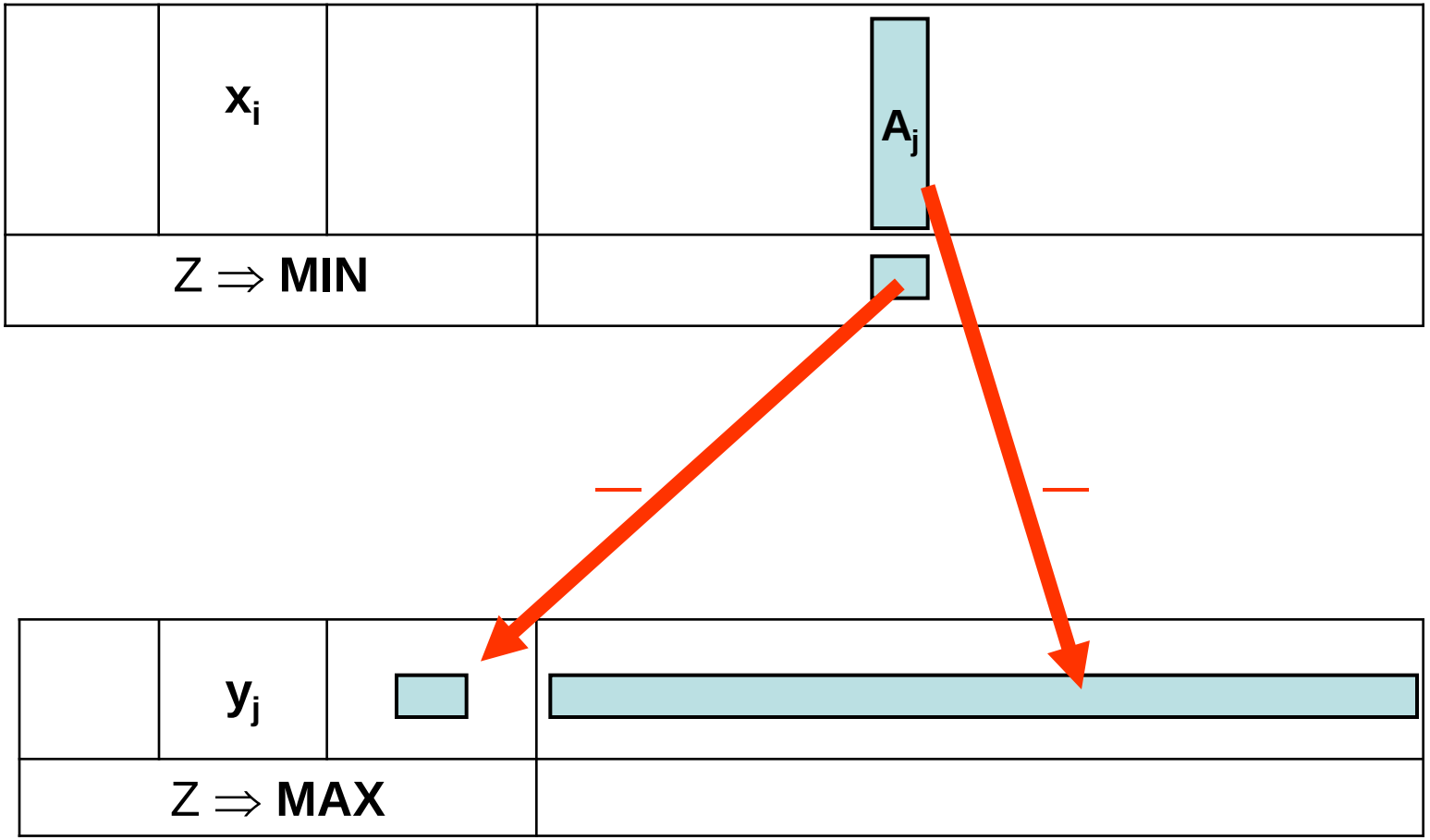
0	x_3	14.000			1	5/3	-26/9
4	x_1	3.000	1			1/6	-1/9
3	x_2	1.000		1		-1/6	2/9
Z = 15.000			0	0	0	1/6	2/9
			y_4	y_5	y_1	y_2	y_3

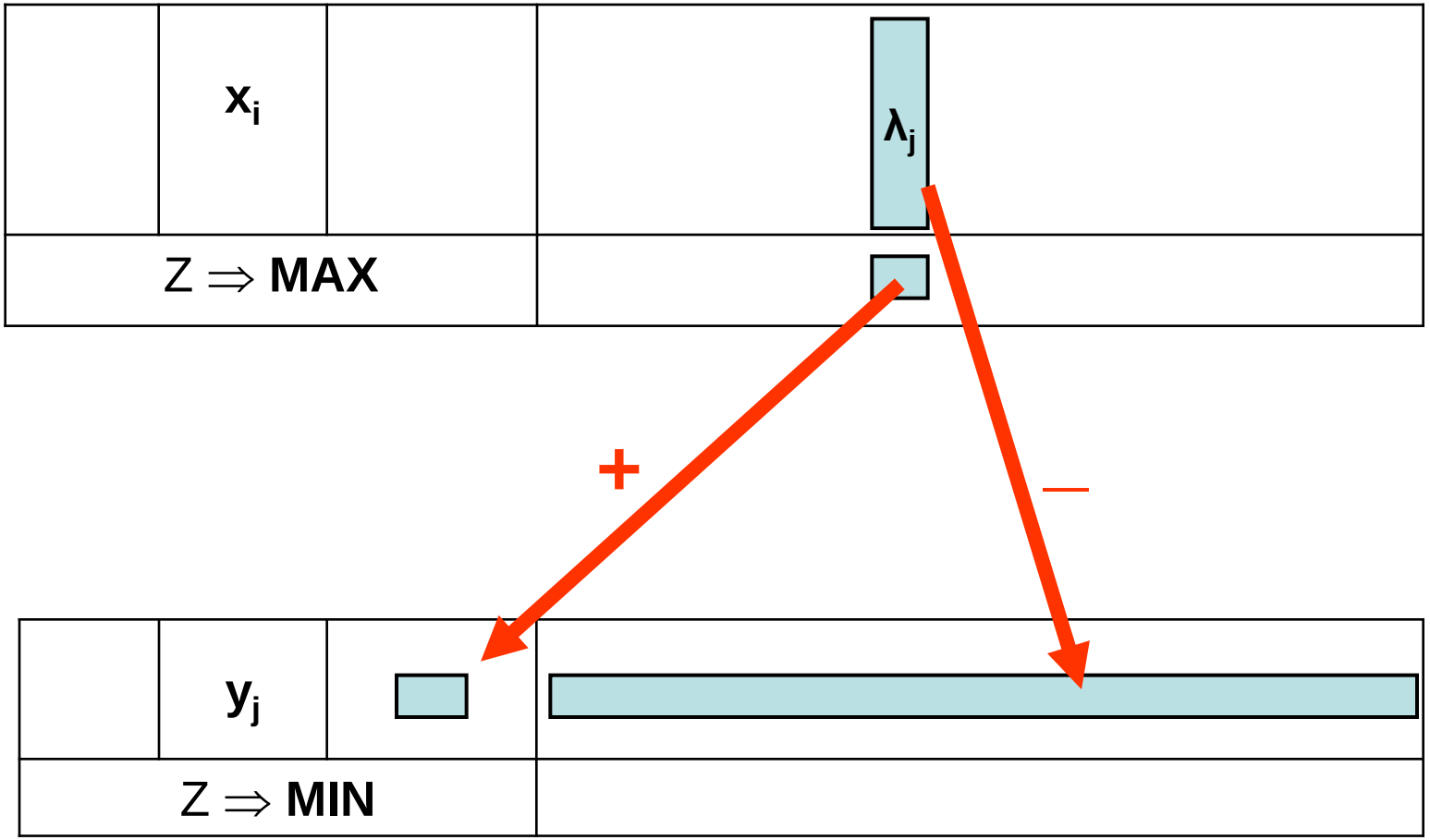
42.000	y_2	1/6	5/3	1		-1/6	1/6
36.000	y_3	2/9	2/9		1	1/9	-2/9
Z = 15.000			-14.000	0	0	-3.000	-1.000
			x_3	x_4	x_5	x_1	x_2

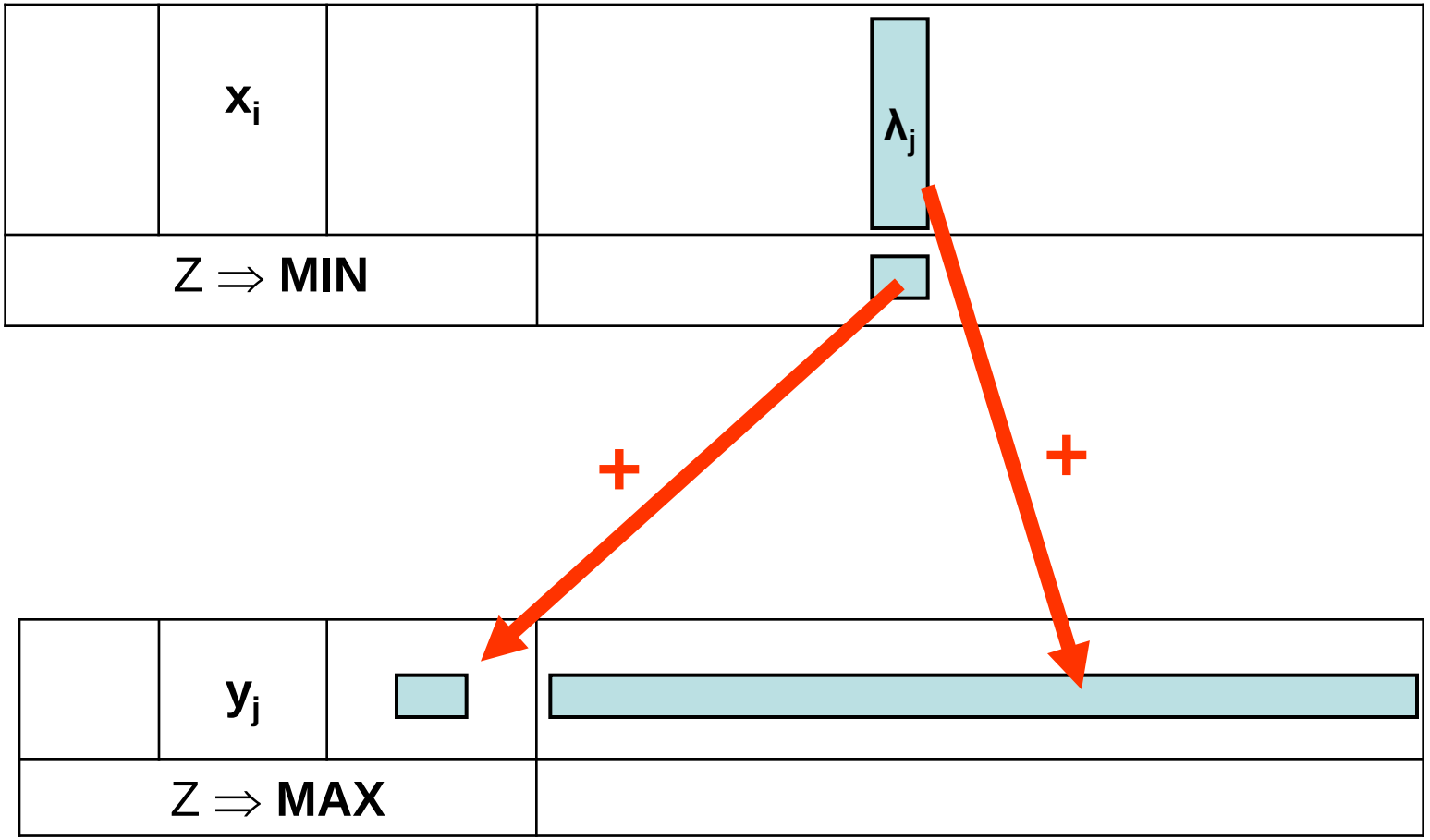

x_i
$Z \Rightarrow$ MAX
y_j
$Z \Rightarrow$ MIN


x_i
$Z \Rightarrow$ MIN
+
y_j
$Z \Rightarrow$ MAX


x_i
A_j
$Z \Rightarrow$ MAX
+
–
y_j
$Z \Rightarrow$ MIN


x_i
A_j
$Z \Rightarrow$ MIN
y_j
$Z \Rightarrow$ MAX


x_i
λ_j
$Z \Rightarrow$ MAX
+
–
y_j
$Z \Rightarrow$ MIN


x_i
λ_j
$Z \Rightarrow$ MIN
+
+
y_j
$Z \Rightarrow$ MAX

MIN: $Z = x_1 + 0{,}5\, x_2 + 2\, x_3$

Sujeto a:

$$\begin{cases} 3\, x_1 + 2\, x_2 + 4\, x_3 \leq 3{,}6 \\ x_1 + 0{,}5\, x_2 + 2\, x_3 \geq 1{,}2 \\ x_1 + x_2 + x_3 = 1 \end{cases}$$

siendo: $x_1, x_2, x_3 \geq 0$

			1	0,5	2			M
c_K	x_K	B_K	A_1	A_2	A_3	A_4	A_5	λ
1	x_1	0,4	1	2		1		4
0	x_5	0,4		-0,5		-1	1	-2
2	x_3	0,6		1	1	-1		-3
Z (MIN) = 1,6				-0,5		-1		-2-M
			y_4	y_5	y_6	y_1	y_2	y_3

			3,6	1,2	1			
b_K	x_K	B_K	A'_1	A'_2	A'_3	A'_4	A'_5	A'_6
3,6	y_1	1	1	1		-1		1
1	y_3	-2		-2	1	4		- 3
0	y_5	0,5		0,5		-2	1	-1
Z (MAX) = 1,6				0,4		0,4		0,6
			x_4	x_5	x_6	x_1	x_2	x_3

			1	0,5	2			M
c_K	x_K	B_K	A_1	A_2	A_3	A_4	A_5	λ
1	x_1	0,4	1	2		1		4
0	x_5	0,4		-0,5		-1	1	-2
2	x_3	0,6		1	1	-1		-3
Z (MIN) = 1,6				-0,5		-1		-2-M
			y_4	y_5	y_6	y_1	y_2	y_3

			3,6	1,2	1			
b_K	x_K	B_K	A'_1	A'_2	A'_3	A'_4	A'_5	A'_6
3,6	y_1	1	1	1		-1		1
1	y_3	-2		-2	1	4		3
0	y_5	0,5		**0,5**		**-2**	1	**-1**
Z (MAX) = 1,6				0,4		0,4		0,6
			x_4	x_5	x_6	x_1	x_2	x_3

			1	0,5	2			M
c_K	x_K	B_K	A_1	A_2	A_3	A_4	A_5	λ
1	x_1	0,4	1	2		1		4
0	x_5	0,4		-0,5		-1	1	-2
2	x_3	0,6		1	1	-1		-3
Z (MIN) = 1,6				-0,5		-1		-2-M
			y_4	y_5	y_6	y_1	y_2	y_3

			3,6	1,2	1			
b_K	x_K	B_K	A'_1	A'_2	A'_3	A'_4	A'_5	A'_6
3,6	y_1	1	1	**1**		**-1**		**1**
1	y_3	-2		-2	1	4		3
0	y_5	0,5		0,5		-2	1	-1
Z (MAX) = 1,6				0,4		0,4		0,6
			x_4	x_5	x_6	x_1	x_2	x_3

			1	0,5	2			M
c_K	x_K	B_K	A_1	A_2	A_3	A_4	A_5	λ
1	x_1	0,4	1	2		1		4
0	x_5	0,4		-0,5		-1	1	-2
2	x_3	0,6		1	1	-1		-3
Z (MIN) = 1,6				-0,5		-1		-2-M
			y_4	y_5	y_6	y_1	y_2	y_3

			3,6	1,2	1			
b_K	x_K	B_K	A'_1	A'_2	A'_3	A'_4	A'_5	A'_6
3,6	y_1	1	1	1		-1		1
1	y_3	-2		**-2**	1	**4**		**- 3**
0	y_5	0,5		0,5		-2	1	-1
Z (MAX) = 1,6				0,4		0,4		0,6
			x_4	x_5	x_6	x_1	x_2	x_3

			1	0,5	2			M
c_K	x_K	B_K	A_1	A_2	A_3	A_4	A_5	λ
1	x_1	0,4	1	2		1		**4**
0	x_5	0,4		-0,5		-1	1	**-2**
2	x_3	0,6		1	1	-1		**-3**
Z (MIN) = 1,6				-0,5		-1		**-2-M**
			y_4	y_5	y_6	y_1	y_2	y_3

			3,6	1,2	1			
b_K	x_K	B_K	A'_1	A'_2	A'_3	A'_4	A'_5	A'_6
3,6	y_1	1	1	1		-1		1
1	y_3	**-2**		**-2**	**1**	**4**		**3**
0	y_5	0,5		0,5		-2	1	-1
Z (MAX) = 1,6				0,4		0,4		0,6
			x_4	x_5	x_6	x_1	x_2	x_3

TEOREMA FUNDAMENTAL DE LA DUALIDAD

DIRECTA FINITA $\Leftrightarrow$ DUAL FINITA

$Z_{\text{ÓPTIMO DIRECTO}} = Z_{\text{ÓPTIMO DUAL}}$

DEGENERADA $\Leftrightarrow$ ALTERNATIVA

INCOMPATIBLE $\Leftrightarrow$ POL. ABIERTO

		c_j	3	3	0	0	0
c_k	x_k	B	A_1	A_2	A_3	A_4	A_5
0	x_3	14.000			1	5/3	-26/9
3	x_1	3.000	1			1/6	-1/9
3	x_2	1.000		1		-1/6	2/9
Z = 12.000			0	0	0	**0***	3/9

ALTERNATIVA

		c_j	3	3	0	0	0
c_k	x_k	B	A_1	A_2	A_3	A_4	A_5
42.000	y_2	0	-5/3	1		-1/6	1/6
36.000	y_3	3/9	26/9		1	1/9	-2/9
Z = 12.000			-14.000	0	0	-3.000	-1.000

DEGENERADA

INTERPRETACIÓN ECONÓMICA DEL PROBLEMA DUAL

$6\ y_1$

$$6\ y_1 + \qquad 12\ y_2$$

$$6\ y_1 + \qquad 12\ y_2 + \qquad 9\ y_3$$

$$6\ y_1 + \quad 12\ y_2 + \quad 9\ y_3 \geq \quad 4$$

	EST	SOL	PIN		
A)	$6\ y_1 +$	$12\ y_2 +$	$9\ y_3$	$\geq$	4

	EST	SOL	PIN	
A)	$6\ y_1 +$	$12\ y_2 +$	$9\ y_3$	$\geq\ 4$
B)	$16\ y_1 +$	$6\ y_2 +$	$9\ y_3$	$\geq\ 3$

	EST	SOL	PIN		
A)	$6\ y_1 +$	$12\ y_2 +$	$9\ y_3$	$\geq$	4
B)	$16\ y_1 +$	$6\ y_2 +$	$9\ y_3$	$\geq$	3

$$Z = 48.000\ y_1 + 42.000\ y_2 + 36.000\ y_3 \Rightarrow \text{Mín}$$

EST SOL PIN A B

A) $6\ y_1 + 12\ y_2 + 9\ y_3 - y_4 = 4$

B) $16\ y_1 + 6\ y_2 + 9\ y_3 - y_5 = 3$

$$Z = 48.000\ y_1 + 42.000\ y_2 + 36.000\ y_3 \Rightarrow \text{Mín}$$