

MAX: $Z = 4 x_1 + 3 x_2$

Sujeto a:

$$\left\{ \begin{array}{l} 6 x_1 + 16 x_2 \leq 48000 \\ 12 x_1 + 6 x_2 \leq 42000 \\ 9 x_1 + 9 x_2 \leq 36000 \end{array} \right.$$

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

$$\begin{cases} 6x_1 + 16x_2 + x_3 & = 48000 \\ 12x_1 + 6x_2 + x_4 & = 42000 \\ 9x_1 + 9x_2 + x_5 & = 36000 \end{cases}$$

$$Z = 4x_1 + 3x_2 + 0x_3 + 0x_4 + 0x_5$$

		c_j						
c_k	x_k	B	A₁	A₂	A₃	A₄	A₅	b_i/a_{ij}
Z								

$$\begin{cases} 6x_1 + 16x_2 + x_3 & = 48000 \\ 12x_1 + 6x_2 + x_4 & = 42000 \\ 9x_1 + 9x_2 + x_5 & = 36000 \end{cases}$$

$$Z = 4x_1 + 3x_2 + 0x_3 + 0x_4 + 0x_5$$

		c_j	4	3	0	0	0	
c_k	x_k	B	A₁	A₂	A₃	A₄	A₅	b_i/a_{ij}
0	x_3	48.000	6	16	1			
0	x_4	42.000	12	6		1		
0	x_5	36.000	9	9			1	
Z								

$$\begin{cases} 6x_1 + 16x_2 + x_3 & = 48000 \\ 12x_1 + 6x_2 + x_4 & = 42000 \\ 9x_1 + 9x_2 + x_5 & = 36000 \end{cases}$$

$$Z = 4x_1 + 3x_2 + 0x_3 + 0x_4 + 0x_5$$

		c_j	4	3	0	0	0	
c_k	x_k	B	A₁	A₂	A₃	A₄	A₅	b_i/a_{ij}
0	x_3	48.000	6	16	1			
0	x_4	42.000	12	6		1		
0	x_5	36.000	9	9			1	
Z = 0								

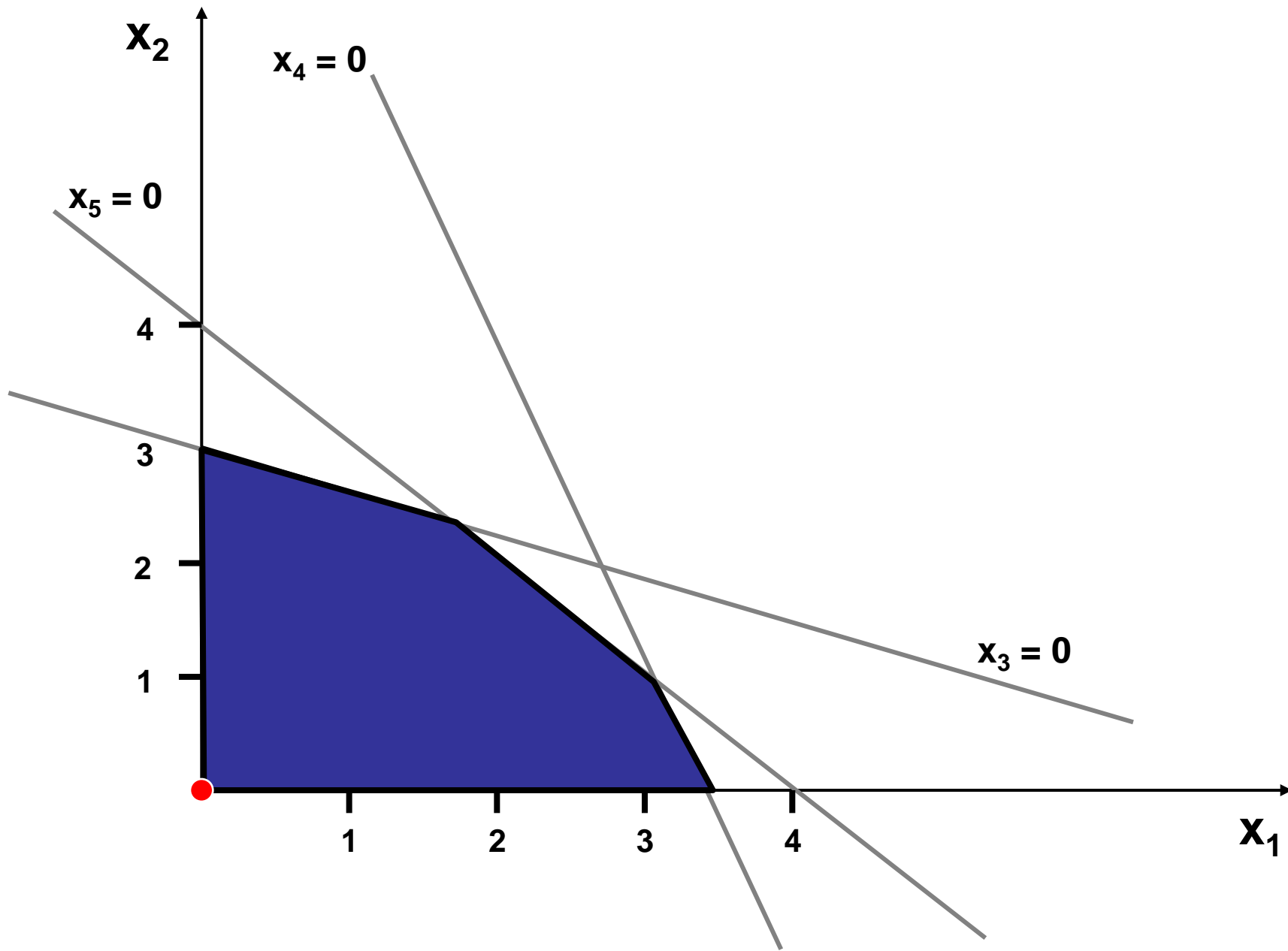
$$Z = \sum c_k \cdot x_k$$


$$\begin{cases} 6x_1 + 16x_2 + x_3 & = 48000 \\ 12x_1 + 6x_2 + x_4 & = 42000 \\ 9x_1 + 9x_2 + x_5 & = 36000 \end{cases}$$

$$Z = 4x_1 + 3x_2 + 0x_3 + 0x_4 + 0x_5$$

		c_j	4	3	0	0	0		
c_k	x_k	B	A₁	A₂	A₃	A₄	A₅	b_i/a_{ij}	
0	x_3	48.000	6	16	1				
0	x_4	42.000	12	6		1			
0	x_5	36.000	9	9			1		
Z = 0			-4	-3	0	0	0		

$$Z_j - c_j = \sum c_k a_{kj} - c_j$$

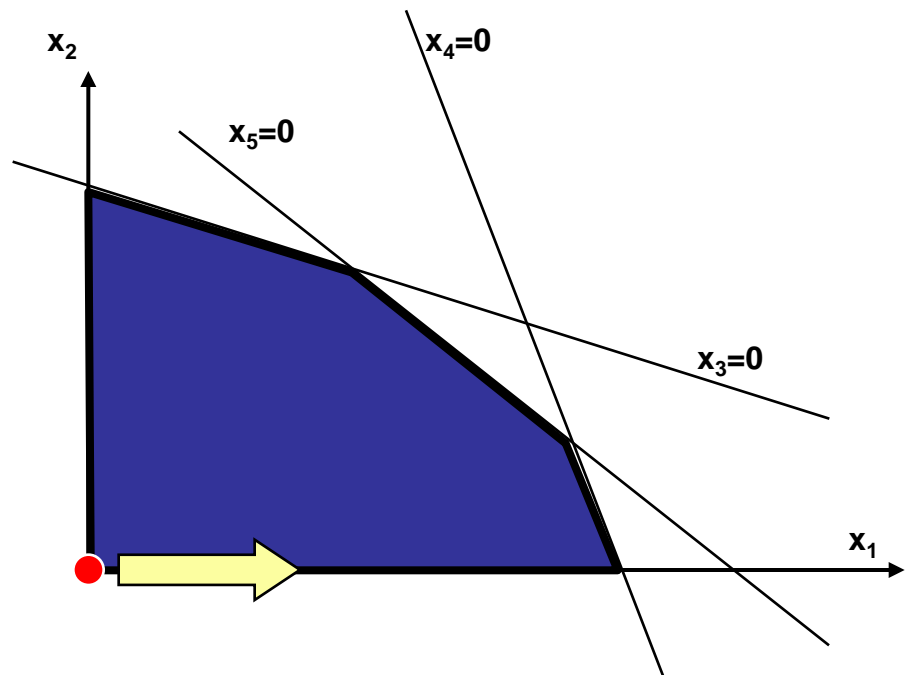


		c_j	4	3	0	0	0	
c_k	x_k	B	A₁	A₂	A₃	A₄	A₅	b_i/a_{ij}
0	x_3	48.000	6	16	1			
0	x_4	42.000	12	6		1		
0	x_5	36.000	9	9			1	
$Z = 0$			- 4	- 3	0	0	0	

		C_j	4	3	0	0	0	
C_k	X_k	B	A₁	A₂	A₃	A₄	A₅	b_i/a_{ij}
0	x_3	48.000	6	16	1			
0	x_4	42.000	12	6		1		
0	x_5	36.000	9	9			1	
$Z = 0$			-4	-3	0	0	0	



		C_j	4	3	0	0	0	
C_k	x_k	B	A₁	A₂	A₃	A₄	A₅	b_i/a_{ij}
0	x_3	48.000	6	16	1			
0	x_4	42.000	12	6		1		
0	x_5	36.000	9	9			1	
$Z = 0$			-4	-3	0	0	0	



		c_j	4	3	0	0	0		
c_k	x_k	B	A₁	A₂	A₃	A₄	A₅	b_i/a_{ij}	
0	x_3	48.000	6	16	1			8.000	
0	x_4	42.000	12	6		1		3.500	
0	x_5	36.000	9	9			1	4.000	
$Z = 0$			-4	-3	0	0	0		

↑

←

		c_j	4	3	0	0	0		
c_k	x_k	B	A₁	A₂	A₃	A₄	A₅	b_i/a_{ij}	
0	x_3	48.000	6	16	1			8.000	
0	x_4	42.000	12	6		1		3.500	
0	x_5	36.000	9	9			1	4.000	
$Z = 0$			-4	-3	0	0	0		

↑

$$\theta = \min \frac{b_i}{a_{ij}}$$

		c_j	4	3	0	0	0		
c_k	x_k	B	A₁	A₂	A₃	A₄	A₅	b_i/a_{ij}	
0	x_3	48.000	6	16	1			8.000	
← 0	x_4	42.000	12	6		1		3.500	
0	x_5	36.000	9	9			1	4.000	
$Z = 0$			-4	-3	0	0	0		

↑

		c_j	4	3	0	0	0		
c_k	x_k	B	A₁	A₂	A₃	A₄	A₅	b_i/a_{ij}	
0	x_3	48.000	6	16	1			8.000	
0	x_4	42.000	12	6		1		3.500	
0	x_5	36.000	9	9			1	4.000	
$Z = 0$			- 4	- 3	0	0	0		

	x_3								
	x_1								
	x_5								

		c_j	4	3	0	0	0	
c_k	x_k	B	A₁	A₂	A₃	A₄	A₅	b_i/a_{ij}
0	x_3	48.000	6	16	1			8.000
0	x_4	42.000	12	6		1		3.500
0	x_5	36.000	9	9			1	4.000
$Z = 0$			-4	-3	0	0	0	

0	x_3							
4	x_1							
0	x_5							

		c_j	4	3	0	0	0		
c_k	x_k	B	A₁	A₂	A₃	A₄	A₅	b_i/a_{ij}	
0	x_3	48.000	6	16	1			8.000	
0	x_4	42.000	12	6		1		3.500	
0	x_5	36.000	9	9			1	4.000	
$Z = 0$			-4	-3	0	0	0		

0	x_3				1				
4	x_1		1						
0	x_5						1		
			0		0		0		

		c_j	4	3	0	0	0	
c_k	x_k	B	A₁	A₂	A₃	A₄	A₅	b_i/a_{ij}
0	x_3	48.000	6	16	1			8.000
0	x_4	42.000	12	6		1		3.500
0	x_5	36.000	9	9			1	4.000
$Z = 0$			-4	-3	0	0	0	

0	x_3				1			
4	x_1	3.500	1	1/2		1/12		
0	x_5						1	
			0		0		0	

		c_j	4	3	0	0	0		
c_k	x_k	B	A₁	A₂	A₃	A₄	A₅	b_i/a_{ij}	
0	x_3	48.000	6	16	1			8.000	
0	x_4	42.000	12	6		1		3.500	
0	x_5	36.000	9	9			1	4.000	
$Z = 0$			-4	-3	0	0	0		

0	x_3	27.000			1				
4	x_1	3.500	1	1/2		1/12			
0	x_5						1		
			0		0		0		

$$48.000 - \frac{6 \cdot 42.000}{12}$$

		c_j	4	3	0	0	0		
c_k	x_k	B	A₁	A₂	A₃	A₄	A₅	b_i/a_{ij}	
0	x_3	48.000	6	16	1			8.000	
0	x_4	42.000	12	6		1		3.500	
0	x_5	36.000	9	9			1	4.000	
$Z = 0$			-4	-3	0	0	0		

0	x_3	27.000		13	1				
4	x_1	3.500	1	1/2		1/12			
0	x_5						1		
			0		0		0		

$$16 - \frac{6 \cdot 6}{12}$$

		c_j	4	3	0	0	0		
c_k	x_k	B	A₁	A₂	A₃	A₄	A₅	b_i/a_{ij}	
0	x_3	48.000	6	16	1			8.000	
0	x_4	42.000	12	6		1		3.500	
0	x_5	36.000	9	9			1	4.000	
$Z = 0$			-4	-3	0	0	0		

0	x_3	27.000		13	1	-1/2			
4	x_1	3.500	1	1/2		1/12			
0	x_5						1		
			0		0			0	

$$0 - \frac{1 \cdot 6}{12}$$

		c_j	4	3	0	0	0		
c_k	x_k	B	A₁	A₂	A₃	A₄	A₅	b_i/a_{ij}	
0	x_3	48.000	6	16	1			8.000	
0	x_4	42.000	12	6		1		3.500	
0	x_5	36.000	9	9			1	4.000	
$Z = 0$			-4	-3	0	0	0		

0	x_3	27.000		13	1	-1/2			
4	x_1	3.500	1	1/2		1/12			
0	x_5	4.500						1	
			0		0			0	

$$36.000 - \frac{9 \cdot 42.000}{12}$$

		c_j	4	3	0	0	0	
c_k	x_k	B	A₁	A₂	A₃	A₄	A₅	b_i/a_{ij}
0	x_3	48.000	6	16	1			8.000
0	x_4	42.000	12	6		1		3.500
0	x_5	36.000	9	9			1	4.000
$Z = 0$			-4	-3	0	0	0	

0	x_3	27.000		13	1	-1/2		
4	x_1	3.500	1	1/2		1/12		
0	x_5	4.500		9/2			1	
			0		0		0	

$$9 - \frac{6 \cdot 9}{12}$$

		C_j	4	3	0	0	0		
C_k	x_k	B	A₁	A₂	A₃	A₄	A₅	b_i/a_{ij}	
0	x_3	48.000	6	16	1			8.000	
0	x_4	42.000	12	6		1		3.500	
0	x_5	36.000	9	9			1	4.000	
$Z = 0$			-4	-3	0	0	0		

0	x_3	27.000		13	1	-1/2			
4	x_1	3.500	1	1/2		1/12			
0	x_5	4.500		9/2		-3/4	1		
			0		0		0		

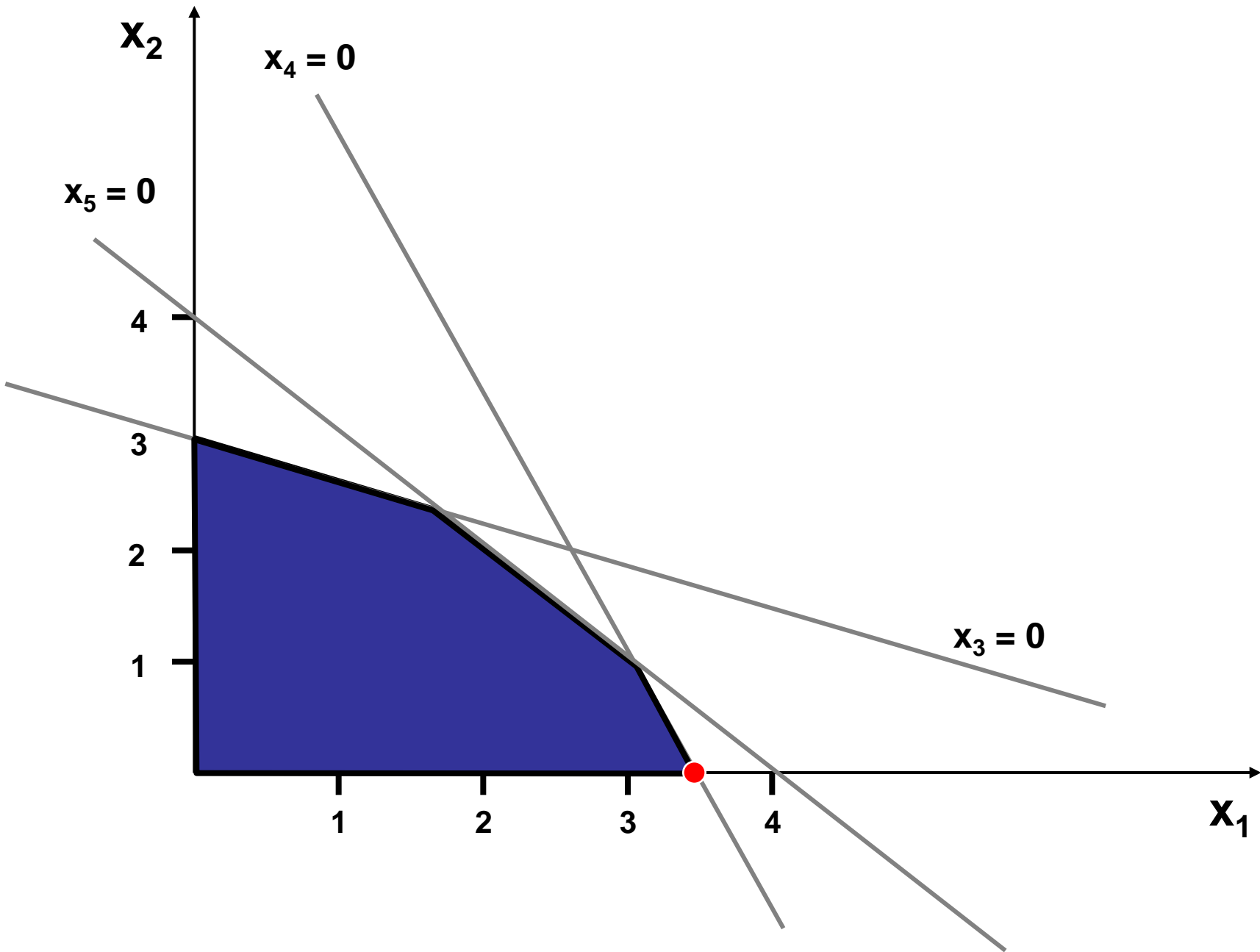
0 - $\frac{1 \cdot 9}{12}$

		C_j	4	3	0	0	0		
C_k	x_k	B	A₁	A₂	A₃	A₄	A₅	b_i/a_{ij}	
0	x_3	48.000	6	16	1			8.000	
0	x_4	42.000	12	6		1		3.500	
0	x_5	36.000	9	9			1	4.000	
$Z = 0$			- 4	- 3	0	0	0		

0	x_3	27.000		13	1	-1/2			
4	x_1	3.500	1	1/2		1/12			
0	x_5	4.500		9/2		-3/4	1		
$Z = 14.000$			0		0		0		

		C_j	4	3	0	0	0		
C_k	x_k	B	A₁	A₂	A₃	A₄	A₅	b_i/a_{ij}	
0	x_3	48.000	6	16	1			8.000	
0	x_4	42.000	12	6		1		3.500	
0	x_5	36.000	9	9			1	4.000	
$Z = 0$			-4	-3	0	0	0		

0	x_3	27.000		13	1	-1/2			
4	x_1	3.500	1	1/2		1/12			
0	x_5	4.500		9/2		-3/4	1		
$Z = 14.000$			0	-1	0	1/3	0		



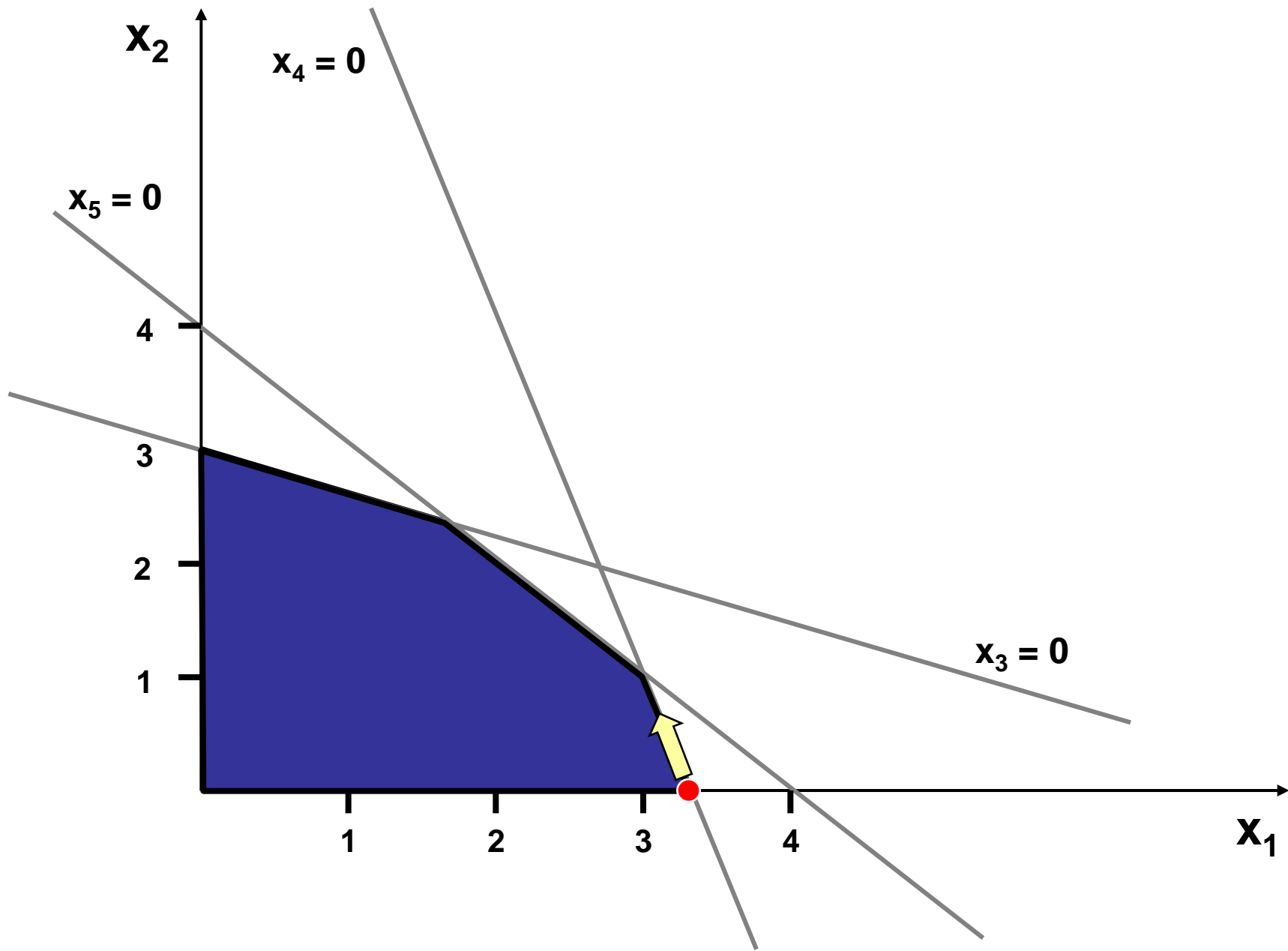
		C_j	4	3	0	0	0		
C_k	x_k	B	A₁	A₂	A₃	A₄	A₅	b_i/a_{ij}	
0	x_3	48.000	6	16	1			8.000	
0	x_4	42.000	12	6		1		3.500	
0	x_5	36.000	9	9			1	4.000	
$Z = 0$			-4	-3	0	0	0		

0	x_3	27.000		13	1	-1/2			
4	x_1	3.500	1	1/2		1/12			
0	x_5	4.500		9/2		-3/4	1		
$Z = 14.000$			0	-1	0	1/3	0		

		C_j	4	3	0	0	0	
C_k	x_k	B	A₁	A₂	A₃	A₄	A₅	b_i/a_{ij}
0	x_3	48.000	6	16	1			8.000
0	x_4	42.000	12	6		1		3.500
0	x_5	36.000	9	9			1	4.000
$Z = 0$			-4	-3	0	0	0	

0	x_3	27.000		13	1	-1/2		
4	x_1	3.500	1	1/2		1/12		
0	x_5	4.500		9/2		-3/4	1	
$Z = 14.000$			0	-1	0	1/3	0	





		C_j	4	3	0	0	0	
C_k	x_k	B	A₁	A₂	A₃	A₄	A₅	b_i/a_{ij}
0	x_3	48.000	6	16	1			8.000
0	x_4	42.000	12	6		1		3.500
0	x_5	36.000	9	9			1	4.000
$Z = 0$			-4	-3	0	0	0	

0	x_3	27.000		13	1	-1/2		2.077
4	x_1	3.500	1	1/2		1/12		7.000
0	x_5	4.500		9/2		-3/4	1	1.000
$Z = 14.000$			0	-1	0	1/3	0	



		c_j	4	3	0	0	0		
c_k	x_k	B	A₁	A₂	A₃	A₄	A₅	b_i/a_{ij}	
0	x_3	48.000	6	16	1			8.000	
0	x_4	42.000	12	6		1		3.500	
0	x_5	36.000	9	9			1	4.000	
$Z = 0$			-4	-3	0	0	0		

0	x_3	27.000		13	1	-1/2		2.077	
4	x_1	3.500	1	1/2		1/12		7.000	
← 0	x_5	4.500		9/2		-3/4	1	1.000	
$Z = 14.000$			0	-1	0	1/3	0		

↑

		c_j	4	3	0	0	0		
c_k	x_k	B	A₁	A₂	A₃	A₄	A₅	b_i/a_{ij}	
0	x_3	48.000	6	16	1			8.000	
0	x_4	42.000	12	6		1		3.500	
0	x_5	36.000	9	9			1	4.000	
$Z = 0$			-4	-3	0	0	0		

0	x_3	27.000		13	1	-1/2		2.077	
4	x_1	3.500	1	1/2		1/12		7.000	
← 0	x_5	4.500		9/2		-3/4	1	1.000	
$Z = 14.000$			0	-1	0	1/3	0		

↑

		C_j	4	3	0	0	0	
C_k	x_k	B	A₁	A₂	A₃	A₄	A₅	b_i/a_{ij}
0	x_3	48.000	6	16	1			8.000
0	x_4	42.000	12	6		1		3.500
0	x_5	36.000	9	9			1	4.000
$Z = 0$			-4	-3	0	0	0	

0	x_3	27.000		13	1	-1/2		2.077
4	x_1	3.500	1	1/2		1/12		7.000
0	x_5	4.500		9/2		-3/4	1	1.000
$Z = 14.000$			0	-1	0	1/3	0	

	x_3				1			
	x_1		1					
	x_2	1.000		1				
Z			0	0	0			

		C_j	4	3	0	0	0		
C_k	x_k	B	A₁	A₂	A₃	A₄	A₅	b_i/a_{ij}	
0	x_3	48.000	6	16	1			8.000	
0	x_4	42.000	12	6		1		3.500	
0	x_5	36.000	9	9			1	4.000	
$Z = 0$			-4	-3	0	0	0		

0	x_3	27.000		13	1	-1/2		2.077	
4	x_1	3.500	1	1/2		1/12		7.000	
0	x_5	4.500		9/2		-3/4	1	1.000	
$Z = 14.000$			0	-1	0	1/3	0		

0	x_3				1				
4	x_1		1						
3	x_2	1.000		1		-1/6	2/9		
Z			0	0	0				

		C_j	4	3	0	0	0	
C_k	x_k	B	A₁	A₂	A₃	A₄	A₅	b_i/a_{ij}
0	x_3	48.000	6	16	1			8.000
0	x_4	42.000	12	6		1		3.500
0	x_5	36.000	9	9			1	4.000
$Z = 0$			-4	-3	0	0	0	

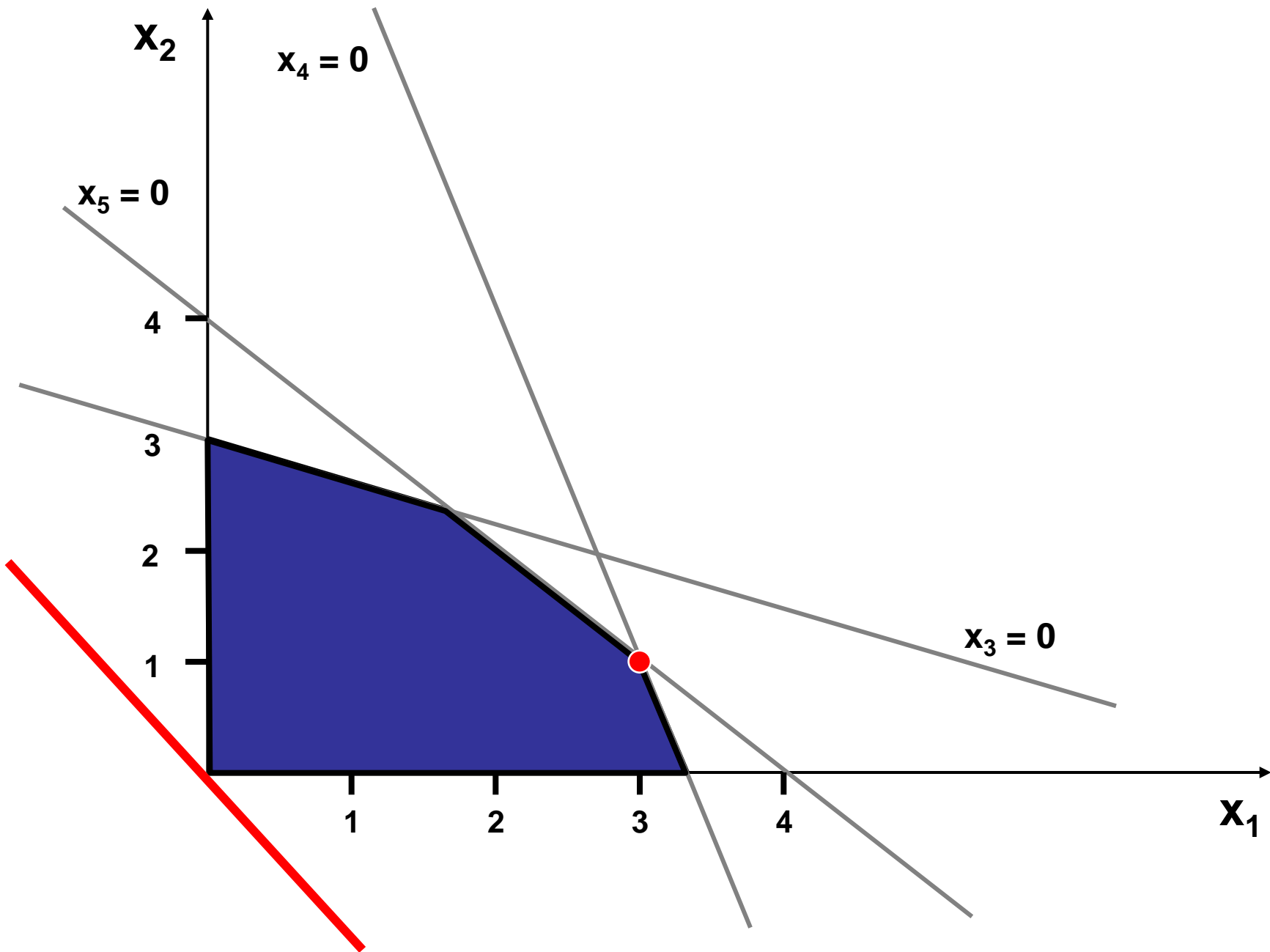
0	x_3	27.000		13	1	-1/2		2.077
4	x_1	3.500	1	1/2		1/12		7.000
0	x_5	4.500		9/2		-3/4	1	1.000
$Z = 14.000$			0	-1	0	1/3	0	

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			0	0	0			

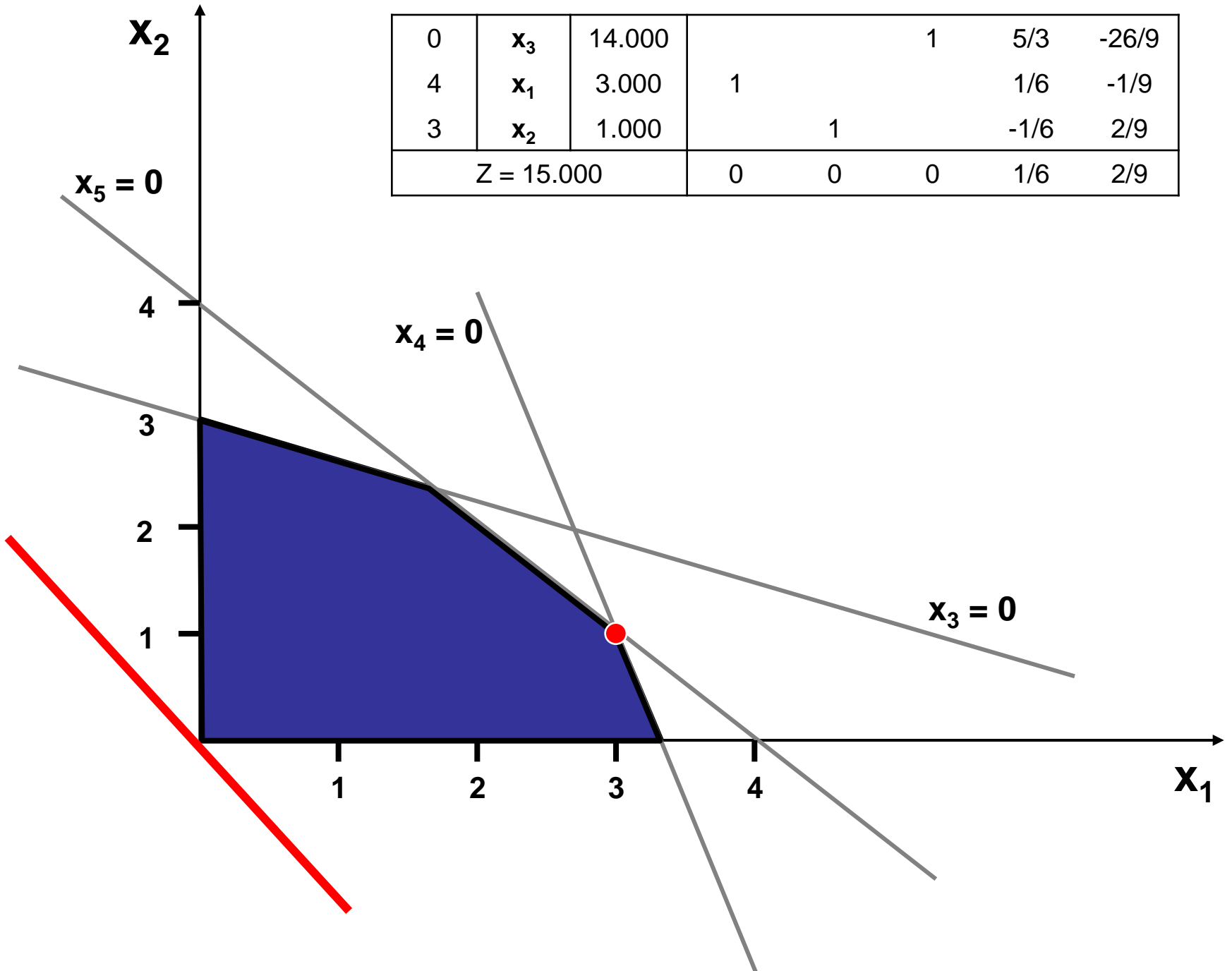
		C_j	4	3	0	0	0		
C_k	x_k	B	A₁	A₂	A₃	A₄	A₅	b_i/a_{ij}	
0	x_3	48.000	6	16	1			8.000	
0	x_4	42.000	12	6		1		3.500	
0	x_5	36.000	9	9			1	4.000	
$Z = 0$			-4	-3	0	0	0		

0	x_3	27.000		13	1	-1/2		2.077	
4	x_1	3.500	1	1/2		1/12		7.000	
0	x_5	4.500		9/2		-3/4	1	1.000	
$Z = 14.000$			0	-1	0	1/3	0		

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		



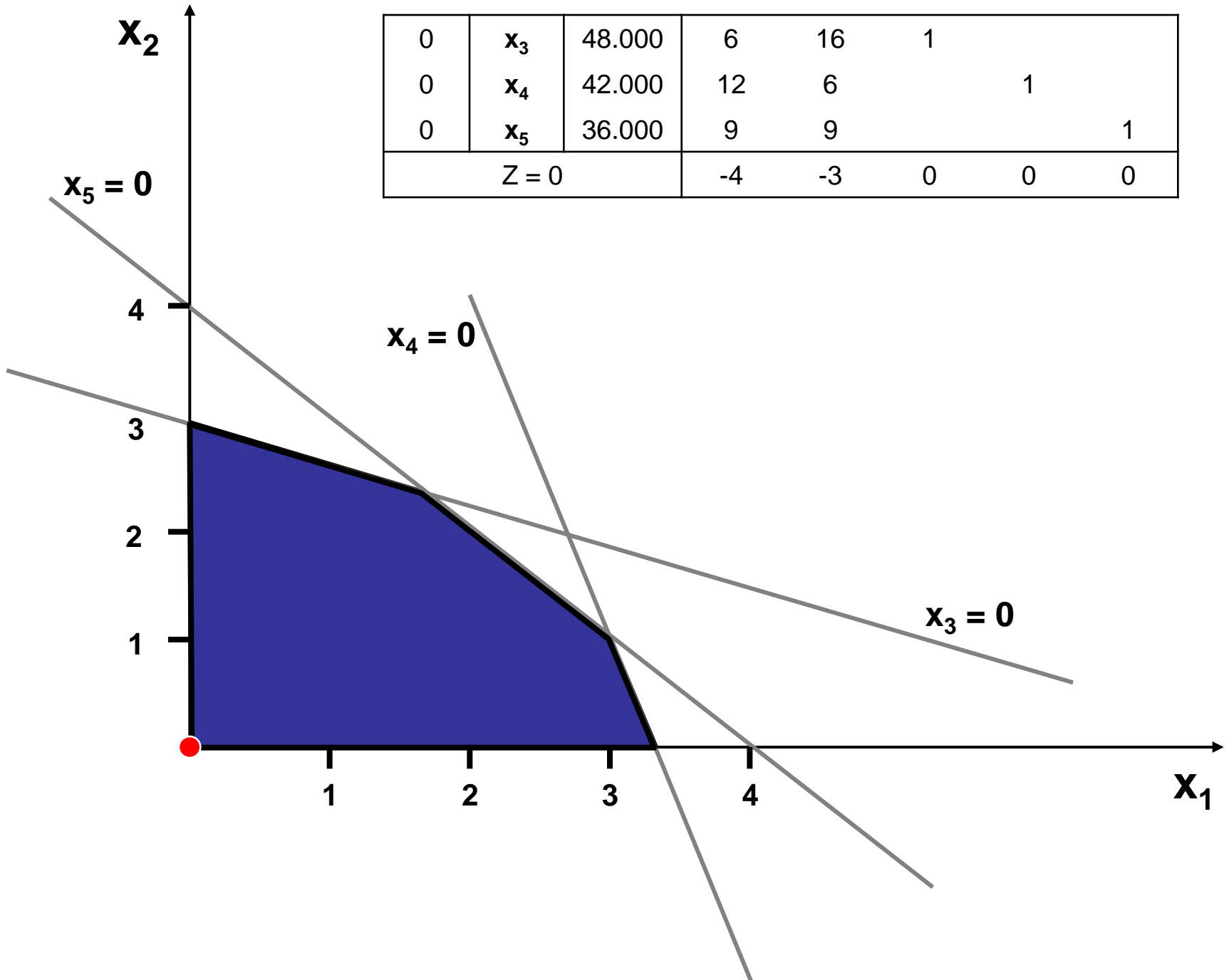
0	x_3	14.000			1	$5/3$	$-26/9$
4	x_1	3.000	1			$1/6$	$-1/9$
3	x_2	1.000		1		$-1/6$	$2/9$
Z = 15.000			0	0	0	$1/6$	$2/9$



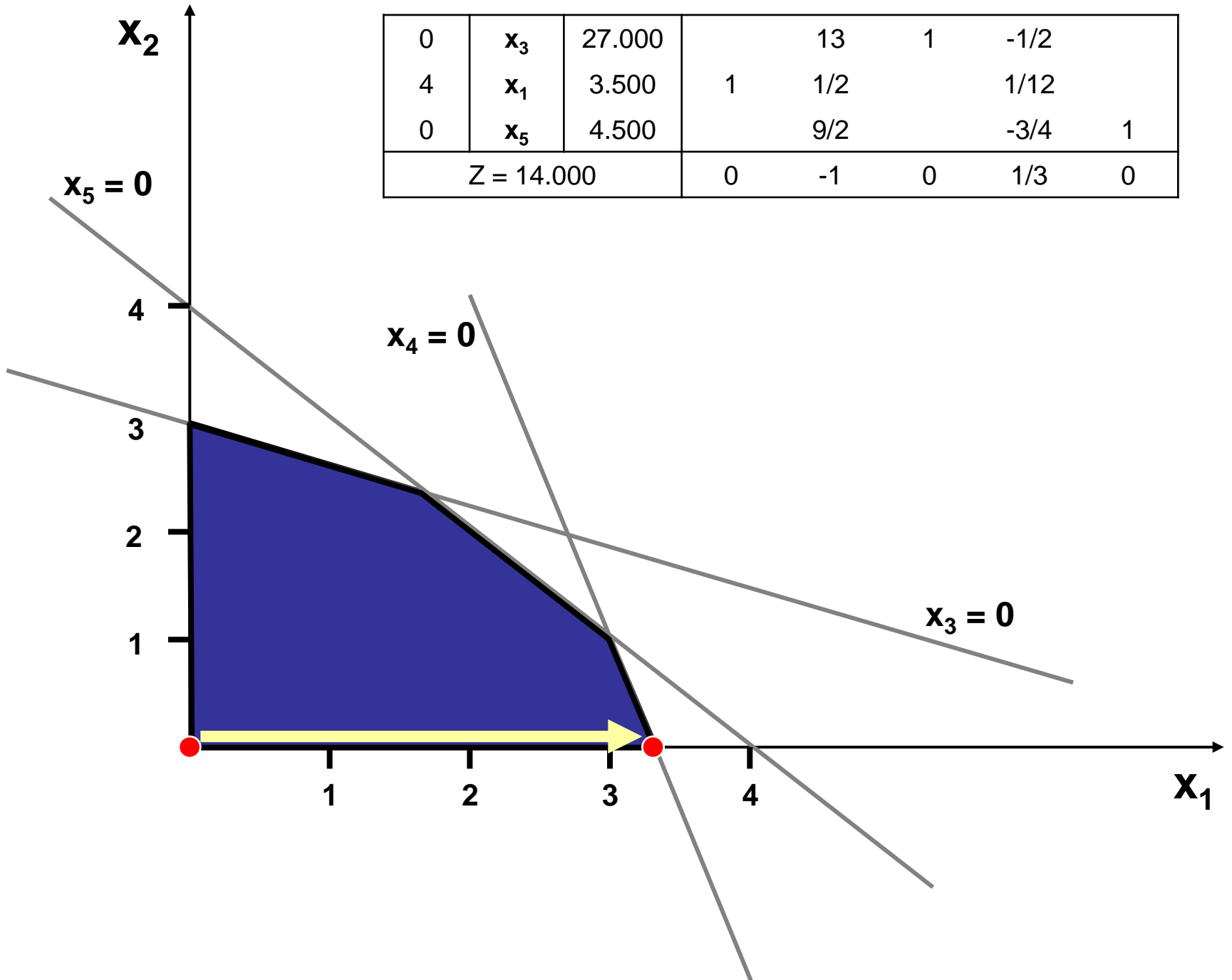
PROCEDIMIENTO "SIMPLEX"

1. PARTE DE UNA BASE FACTIBLE, Y CALCULA EL Z
2. SE PREGUNTA SI LA SOLUCIÓN ES ÓPTIMA. SI LO ES SE TERMINA EL PROCEDIMIENTO.
3. SI NO LO ES, SE PASA A LA BASE VECINA QUE MEJORE MÁS A "Z", SELECCIONANDO UNA VARIABLE QUE INGRESE A LA BASE Y OTRA QUE SALGA.
4. SE VUELVE AL PUNTO 2.

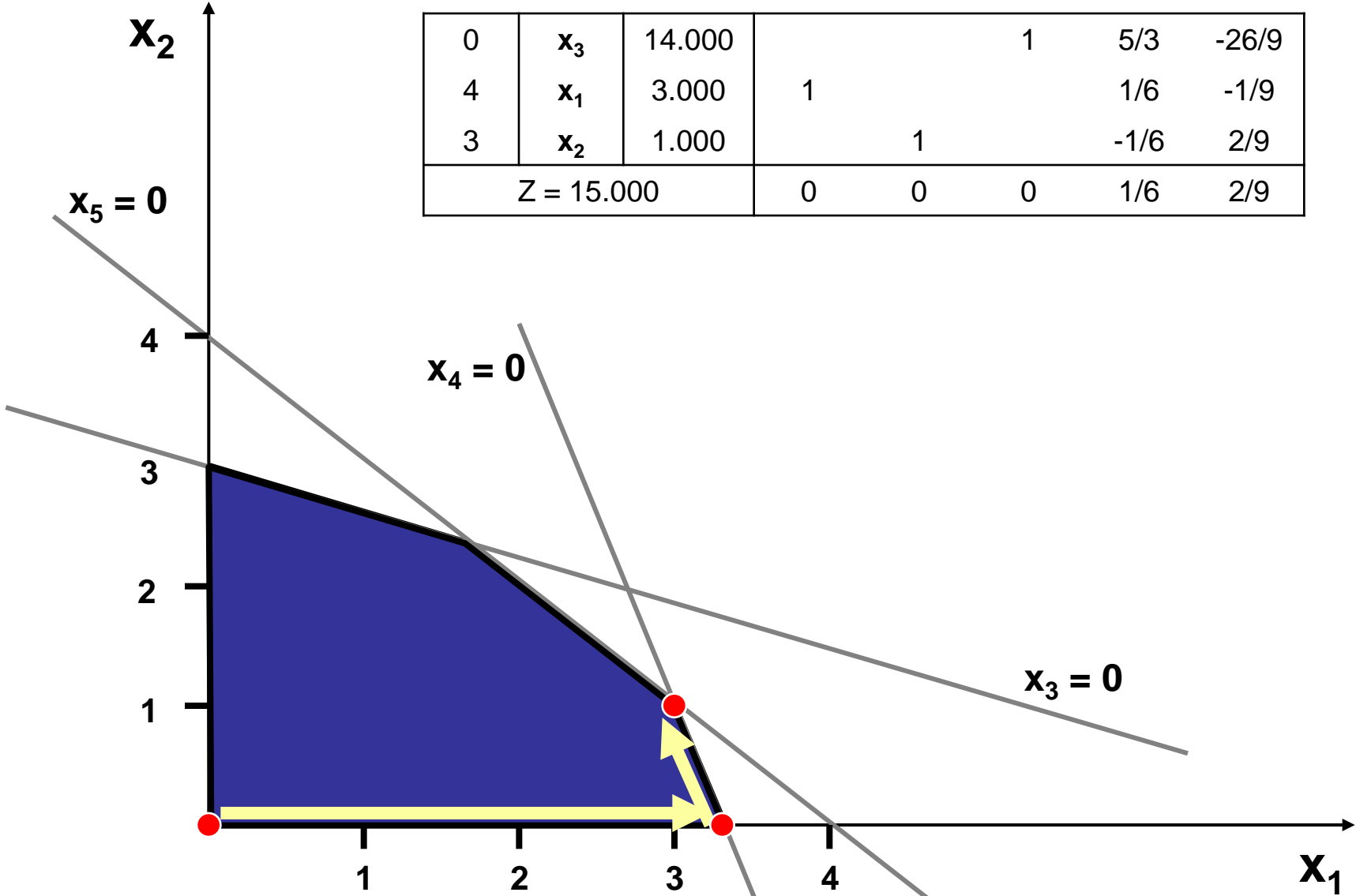
0	x_3	48.000	6	16	1	
0	x_4	42.000	12	6		1
0	x_5	36.000	9	9		1
Z = 0			-4	-3	0	0

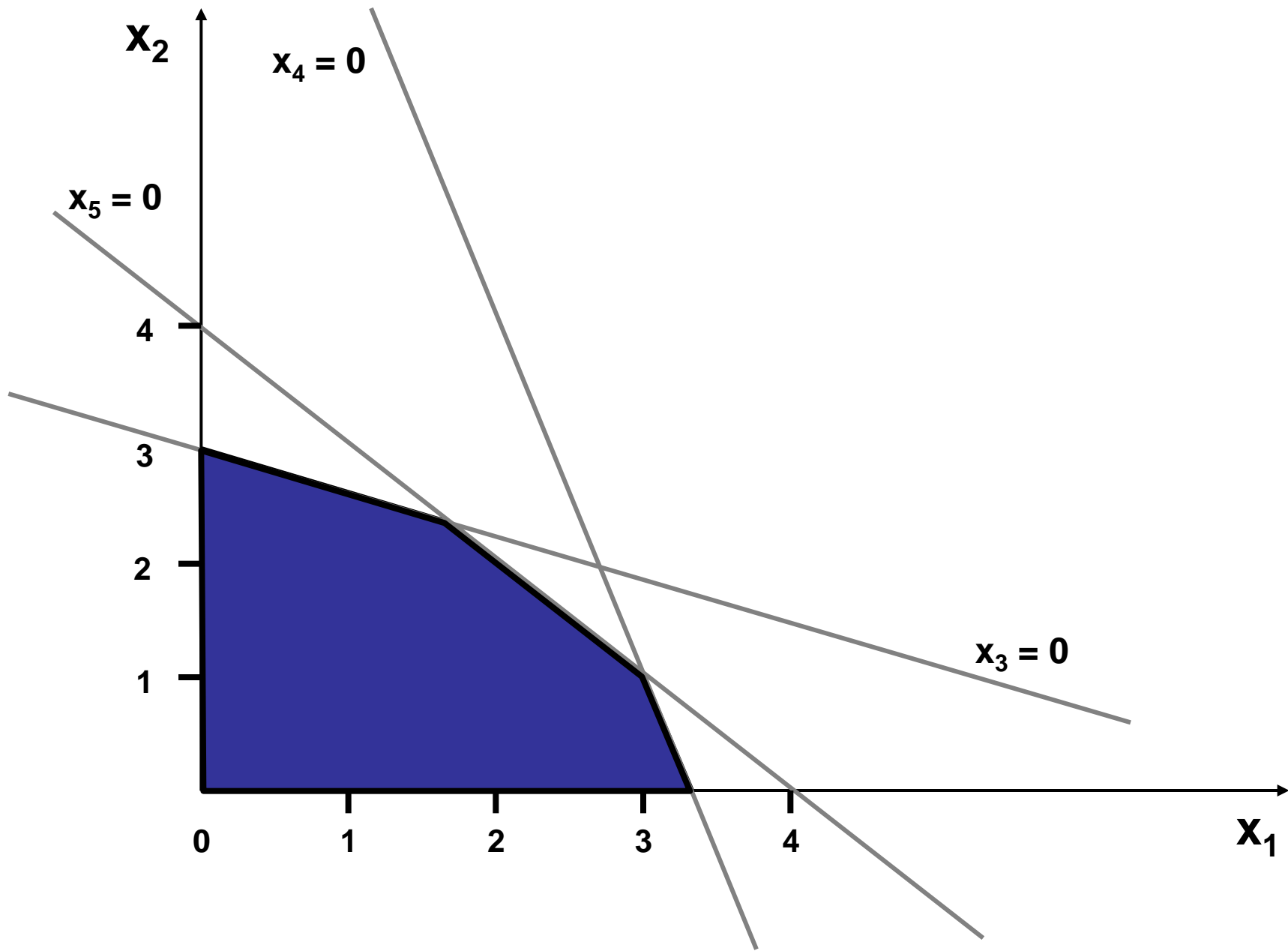


0	x_3	27.000		13	1	-1/2	
4	x_1	3.500	1	1/2		1/12	
0	x_5	4.500		9/2		-3/4	1
Z = 14.000			0	-1	0	1/3	0



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	$1/6$	$2/9$





SISTEMA DE INECUACIONES

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

$$Z = 4 x_1 + 3 x_2$$

SISTEMA DE ECUACIONES

$$\begin{cases} 6x_1 + 16x_2 + x_3 & = 48000 \\ 12x_1 + 6x_2 + x_4 & = 42000 \\ 9x_1 + 9x_2 + x_5 & = 36000 \end{cases}$$

$$Z = 4x_1 + 3x_2 + 0x_3 + 0x_4 + 0x_5$$

FORMULACIÓN MATRICIAL DE LAS CONDICIONES DE VÍNCULO

$$\begin{cases} 6x_1 + 16x_2 + x_3 & = 48.000 \\ 12x_1 + 6x_2 + x_4 & = 42.000 \\ 9x_1 + 9x_2 + x_5 & = 36.000 \end{cases}$$

$$Z = 4x_1 + 3x_2 + 0x_3 + 0x_4 + 0x_5$$

$$\begin{pmatrix} 6 & 16 & 1 & 0 & 0 \\ 12 & 6 & 0 & 1 & 0 \\ 9 & 9 & 0 & 0 & 1 \end{pmatrix} \cdot \begin{pmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \\ x_5 \end{pmatrix} = \begin{pmatrix} 48.000 \\ 42.000 \\ 36.000 \end{pmatrix}$$

FORMULACIÓN MATRICIAL DEL FUNCIONAL

$$\begin{cases} 6x_1 + 16x_2 + x_3 & = 48.000 \\ 12x_1 + 6x_2 + x_4 & = 42.000 \\ 9x_1 + 9x_2 + x_5 & = 36.000 \end{cases}$$

$$Z = 4x_1 + 3x_2 + 0x_3 + 0x_4 + 0x_5$$

$$Z = \begin{pmatrix} 4 & 3 & 0 & 0 & 0 \end{pmatrix} \cdot \begin{pmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \\ x_5 \end{pmatrix}$$

DEFINICIÓN DE VECTORES

$$\begin{cases} 6x_1 + 16x_2 + x_3 & = 48.000 \\ 12x_1 + 6x_2 + x_4 & = 42.000 \\ 9x_1 + 9x_2 + x_5 & = 36.000 \end{cases}$$

$$Z = 4x_1 + 3x_2 + 0x_3 + 0x_4 + 0x_5$$

$$A_1 = \begin{pmatrix} 6 \\ 12 \\ 9 \end{pmatrix}$$

$$A_2 = \begin{pmatrix} 16 \\ 6 \\ 9 \end{pmatrix}$$

$$A_3 = \begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix}$$

$$A_4 = \begin{pmatrix} 0 \\ 1 \\ 0 \end{pmatrix}$$

$$A_5 = \begin{pmatrix} 0 \\ 0 \\ 1 \end{pmatrix}$$

FORMULACIÓN VECTORIAL

$$\begin{cases} 6x_1 + 16x_2 + x_3 & = 48.000 \\ 12x_1 + 6x_2 + x_4 & = 42.000 \\ 9x_1 + 9x_2 + x_5 & = 36.000 \end{cases}$$

$$Z = 4x_1 + 3x_2 + 0x_3 + 0x_4 + 0x_5$$

$$\begin{pmatrix} 6 \\ 12 \\ 9 \end{pmatrix} \cdot x_1 + \begin{pmatrix} 16 \\ 6 \\ 9 \end{pmatrix} \cdot x_2 + \begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix} \cdot x_3 + \begin{pmatrix} 0 \\ 1 \\ 0 \end{pmatrix} \cdot x_4 + \begin{pmatrix} 0 \\ 0 \\ 1 \end{pmatrix} \cdot x_5 = \begin{pmatrix} 48.000 \\ 42.000 \\ 36.000 \end{pmatrix}$$

FORMULACIÓN VECTORIAL

$$\begin{cases} 6x_1 + 16x_2 + x_3 & = 48.000 \\ 12x_1 + 6x_2 + x_4 & = 42.000 \\ 9x_1 + 9x_2 + x_5 & = 36.000 \end{cases}$$

$$Z = 4x_1 + 3x_2 + 0x_3 + 0x_4 + 0x_5$$

$$A_1 \cdot x_1 + A_2 \cdot x_2 + A_3 \cdot x_3 + A_4 \cdot x_4 + A_5 \cdot x_5 = \begin{pmatrix} 48.000 \\ 42.000 \\ 36.000 \end{pmatrix}$$

FORMULACIÓN VECTORIAL

$$\begin{cases} 6x_1 + 16x_2 + x_3 & = 48.000 \\ 12x_1 + 6x_2 + x_4 & = 42.000 \\ 9x_1 + 9x_2 + x_5 & = 36.000 \end{cases}$$

$$Z = 4x_1 + 3x_2 + 0x_3 + 0x_4 + 0x_5$$

$$\sum A_j \cdot x_j = B$$

$$\begin{cases} \mathbf{x}_3 & = \mathbf{b}_1 \\ \mathbf{x}_4 & = \mathbf{b}_2 \\ \mathbf{x}_5 & = \mathbf{b}_3 \end{cases}$$

$$\mathbf{B} = \begin{pmatrix} \mathbf{x}_3 \\ \mathbf{x}_4 \\ \mathbf{x}_5 \end{pmatrix} = \begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix} \mathbf{x}_3 + \begin{pmatrix} 0 \\ 1 \\ 0 \end{pmatrix} \mathbf{x}_4 + \begin{pmatrix} 0 \\ 0 \\ 1 \end{pmatrix} \mathbf{x}_5 = \begin{pmatrix} \mathbf{b}_1 \\ \mathbf{b}_2 \\ \mathbf{b}_3 \end{pmatrix}$$

$$\mathbf{B} = \sum_{k=1}^m \mathbf{A}_k \mathbf{x}_k$$

$$\mathbf{Z} = \mathbf{c}_1 \mathbf{x}_1 + \mathbf{c}_2 \mathbf{x}_2 + \mathbf{c}_3 \mathbf{x}_3 + \mathbf{c}_4 \mathbf{x}_4 + \mathbf{c}_5 \mathbf{x}_5$$

$$\mathbf{Z}^{(1)} = \mathbf{c}_3 \mathbf{x}_3 + \mathbf{c}_4 \mathbf{x}_4 + \mathbf{c}_5 \mathbf{x}_5$$

$$\mathbf{Z}^{(1)} = \sum_{k=1}^m \mathbf{c}_k \mathbf{x}_k$$

$$\mathbf{A}_1 = \begin{pmatrix} \mathbf{a}_{11} \\ \mathbf{a}_{21} \\ \mathbf{a}_{31} \end{pmatrix} = \mathbf{a}_{11} \begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix} + \mathbf{a}_{21} \begin{pmatrix} 0 \\ 1 \\ 0 \end{pmatrix} + \mathbf{a}_{31} \begin{pmatrix} 0 \\ 0 \\ 1 \end{pmatrix}$$

$$\mathbf{A}_2 = \begin{pmatrix} \mathbf{a}_{12} \\ \mathbf{a}_{22} \\ \mathbf{a}_{32} \end{pmatrix} = \mathbf{a}_{12} \begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix} + \mathbf{a}_{22} \begin{pmatrix} 0 \\ 1 \\ 0 \end{pmatrix} + \mathbf{a}_{32} \begin{pmatrix} 0 \\ 0 \\ 1 \end{pmatrix}$$

$$\mathbf{A}_j = \sum_1^m \mathbf{a}_{ij} \mathbf{A}_k$$

Cambio de base

$$\begin{cases} a_{11}x_1 + x_3 & = b_1 \\ a_{21}x_1 + x_4 & = b_2 \\ a_{31}x_1 + x_5 & = b_3 \end{cases}$$

$$\begin{cases} x_3 = b_1 - a_{11}x_1 \geq 0 \\ x_4 = b_2 - a_{21}x_1 \geq 0 \\ x_5 = b_3 - a_{31}x_1 \geq 0 \end{cases}$$

$$\begin{cases} x_1 \leq \frac{b_1}{a_{11}} \\ x_1 \leq \frac{b_2}{a_{21}} \\ x_1 \leq \frac{b_3}{a_{31}} \end{cases}$$

$$x_1 = \min \frac{b_i}{a_{ij}} = \theta$$

Nueva base

$$\begin{cases} a_{11}\theta + x_3 & = b_1 \\ a_{21}\theta + x_4 & = b_2 \\ a_{31}\theta + x_5 & = b_3 \end{cases}$$

$$A_j = \sum_1^m a_{ij} A_k$$

$$\theta A_j = \theta \sum_1^m a_{ij} A_k$$

$$B = \sum_1^m A_k x_k$$

$$B = \sum_1^m A_k x_k + \theta A_j - \theta \sum_1^m a_{ij} A_k$$

$$B = A_j \theta + \sum_1^m A_k (x_k - \theta a_{ij})$$

$$Z^{(2)} = c_j \theta + \sum_1^m c_k (x_k - \theta a_{ij})$$

$$\mathbf{Z}^{(2)} = \mathbf{c}_j \theta + \sum_1^m \mathbf{c}_k (\mathbf{x}_k - \theta \mathbf{a}_{ij})$$

$$\mathbf{Z}^{(2)} = \mathbf{c}_j \theta + \sum_1^m \mathbf{c}_k \mathbf{x}_k - \sum_1^m \theta \mathbf{c}_k \mathbf{a}_{ij}$$

$$\mathbf{Z}^{(2)} = \mathbf{c}_j \theta + \mathbf{Z}^{(1)} - \sum_1^m \theta \mathbf{c}_k \mathbf{a}_{ij}$$

$$\mathbf{Z}^{(2)} = \mathbf{Z}^{(1)} - \theta \left[\sum_1^m \mathbf{c}_k \mathbf{a}_{ij} - \mathbf{c}_j \right]$$

$$\mathbf{Z}^{(2)} = \mathbf{Z}^{(1)} - \theta \cdot (\mathbf{z}_j - \mathbf{c}_j)$$

$$\mathbf{Z}^{(P+1)} = \mathbf{Z}^{(P)} - \theta \cdot (\mathbf{z}_j - \mathbf{c}_j)$$