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Assignment - I

solve by II phase.

max $Z = 5x_1 + 3x_2$

constrains

$3x_1 + 2x_2 \geq 3$.

$x_1 + 4x_2 \geq 4$.

$x_1 + x_2 \leq 5$

→

first convert it into a standard lpp format.

$Z^* = 0x_1 + 0x_2 + 0S_1 + 0S_2 + 0S_3 - A_1 - A_2$

$3x_1 + 2x_2 - S_1 + A_1 = 3$

$x_1 + 4x_2 - S_2 + A_2 = 4$.

$x_1 + x_2 + S_3 = 5$.

	Cj	0	0	0	0	0	-1	-1	
CB	Basic var	XB	x_1	x_2	S_1	S_2	S_3	A_1	A_2	Min
-1	A_1	3	3	2	-1	0	0	1	0	3/2
-1	A_2	4	1	4	0	-1	0	0	1	1
0	S_3	5	1	1	0	0	1	0	0	5
	Zj-Cj	-4	-6	1	1	0	0	0		

	Cj	0	0	0	0	0	−1	
C_B	Basic	X_B	X_1	X_2	S_1	S_2	S_3	A_1
−1	A_1	1	5/2	0	−1	1/2	0	1
0	x_2	1	1/4	1	0	−1/4	0	0
0	S_3	4	3/4	0	0	1/4	1	0
	$Z_j - C_j$	1	−5/2	0	1	−1/2	0	0

	Cj	0	0	0	0	0	
C_B	Basic	X_B	X_1	X_2	S_1	S_2	S_3	Min ratio
0	x_1	2/5	1	0	−2/5	1/5	0	
0	x_2	9/10	0	1	−1/10	−3/10	0	
0	S_3	1/10	0	0	1/10	3/10	1	
	$Z_j - C_j$	0	0	0	0	0	0	

1) $\frac{2}{5} \times \frac{1}{4} = \frac{2}{20} = \frac{1}{10} - 1 = \frac{9}{10}$

2) $\frac{1}{4}$

3) 0

4) $\frac{-2}{5} \times \frac{1}{4} = \frac{-2}{20} = \frac{-1}{10}$

5) $\frac{1}{20} - \frac{1}{4} \quad \frac{-5+1}{20} \quad \frac{-4}{20} = \frac{1}{5}$

Now phase II.

C_B	Basic	C_j / X_B	5 / x_1	3 / x_2	0 / s_1	0 / s_2	0 / s_3	Min.
5	x_1	2/5	1	0	-2/5	1/5	0	x_1
3	x_2	9/10	0	1	1/10	-2/10	0	x_2
0	s_3	37/10	0	0	3/10	-1/10	1	37/3
			0	0	-17/10	2/10	0	

C_B	Basic	x_B	5 / x_1	3 / x_2	0 / s_1	0 / s_2	0 / s_3	Min
5	x_1	4/5	1	0	-1	0	-4/5	x_1
3	x_2	1	0	1	-3	0	-1/3	x_2
0	s_3	3	0	0	1	1	3/10	
		$z_j - c_j$	0	7	0	-5	0	

Min ratio

37-3 / 10 10

C_B	Basic	x_B	x_1	x_2	s_1	s_2	s_3	Min
5	x_1	1	1	0	0	0	1	
0	s_1	11	0	1	1	0	3	
0	s_2	1	0	-3	0	1		
			0	2	0	0	5	

Ex.

Max $Z = 3x_1 + 2x_2$

Subject to,

$x_1 + x_2 \leq 4$

$-x_1 + x_2 \leq -2$

where $x_1, x_2 \geq 0$.

Solution:

The standard LPP format

$Z = 3x_1 + 2x_2$

subject to

$x_1 + x_2 \leq 4$

$-x_1 + x_2 \leq -2$

$x_1 + x_2 + s_1 \leq 4$

$Ax = B \quad -x_1 + x_2 + s_2 \leq -2$

$$\begin{bmatrix} 1 & 1 & 1 & 0 \\ -1 & 1 & 0 & 1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ s_1 \\ s_2 \end{bmatrix} = \begin{bmatrix} 4 \\ -2 \end{bmatrix}$$

	C_j	3	2	0	0	
Basic	C_B	X_B	X_1	X_2	S_1	S_2	
S_1	0	4	1	1	1	0	
S_2	0	-2	-1	1	0	1	
		$Z_j - C_j$	-3	-2	0	0	

C_B	Basic var	X_B	x_1	x_2	S_1	S_2	
0	x_1	$2/13$	1	0	$-7/13$	$1/13$	
0	x_2	$10/13$	0	1	$2/13$	$-2/13$	
		0	0	0	0	0	
	C_j		1	1	0	0	
C_B	Basic	X_B	x_1	x_2	S_1	S_2	
1	x_1	$2/13$	1	0	$-7/13$	$1/13$	$-3\times$
1	x_2	$10/13$	0	1	$2/13$	$-2/13$	$10\checkmark$
			0	0	$-6/13$	$-1/13$	
			1	1	0		
C_B	Basic	X_B	x_1	x_2	S_1	S_2	
1	x_1	$-3/7$	1	0	-1		
0	S_1	10	0	1	-2		
	$z_j - c_j$		0	0	-1		

Unbounded solution.