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Step 7: Transition from 2nd table to 3rd table:

	Qty	x_1	x_2	S_1	S_2	A_1
A_1	850	1	0	0	1	1
x_1	300	(1)	0	1	0	0
x_2	150	0	1	0	-1	0

Replace R_1 with $(R_1 - 1R_2)$

	Qty	x_1	x_2	S_1	S_2	A_1
	(850-300)	(1-1)	(0-0)	(0-1)	(1-0)	(1-0)
A_1	550	0	0	-1	1	1
x_1	300	1	0	1	0	0
x_2	150	0	1	0	-1	0

Step 8: Third simplex table:

			5	6	0	0	M	
C_j	Sol^n mix	Qty	x_1	x_2	S_1	S_2	A_1	Ratio
M	A_1	550	0	0	-1	(1)	1	550 →
5	x_1	300	1	0	1	0	0	-
6	x_2	150	0	1	0	[-1] (Make it zero)	0	-
Z_j	-	(2400 + 550M)	5	6	-M+5	M-6	M	
$C_j - Z_j$	-	-	0	0	M-5	-M+6	0	

↑ 1M = 1000

As artificial variable has become outgoing variable, that column will be removed.

New incoming variable = S_2.
" outgoing variable = A_1

Key element = 1

Step 9: Transition from table 3 to table 4:

		Qty	x_1	x_2	S_1	S_2
S_2	~~A_1~~	550	0	0	-1	(1)
	x_1	300	1	0	1	0
	x_2	150	0	1	0	-1

$0-(-1)\times-1$

~~Add R3~~ → Replace R_3 by $R_3 - (-1)R_1$

	qty	x_1	x_2	S_1	S_2
S_2	550	0	0	-1	1
x_1	300	1	0	1	0
x_2	700	0	1	-1	0

Step 10 Simplex table 4 :-

			5	6	0	0	
C_j	col^n min	qty	x_1	x_2	S_1	S_2	Ratio
0	S_2	550	0	0	-1	1	
5	x_1	300	1	0	1	0	
6	x_2	700	0	1	-1	0	
Z_j	-	5700	5	6	-1	0	
$C_j - Z_j$	-	-	0	0	1	0	

- Optimality for minimisation problem:

When all values in $C_j - Z_j$ row are either zero or positive, then optimality is achieved.

Therefore, 300 kgs of sodium and 700 kgs of potassium should be used.

- Assignment 2:

Solve 2 LPP by simplex method. If maximisation problem there should be 3 decision variables. In minimisation problem, 2 decision variables and 3 constraints.

=> Special rules for simplex Method:

1. Infeasibility - When $C_j - Z_j$ row is indicating optimality but there is atleast 1 artificial variable still present in solution mix. No solution will be there.

2. Unboundedness - It can occur in both types of problems (minimisation & maximization). When all the elements of pivot column are either zero or negative. No solution.
No ratio calculated, no outgoing variable can be determined & hence no solution.

3. Degeneracy - It occurs when there is a tie for smallest positive ratio.
Break the tie by selecting any one variable as outgoing variable & solution will be possible.

4 More than 1 optimal solution:
At optimal solution stage, if there is atleast one variable ~~in~~ which is not in optimal solution mix but will still has 0 value in $C_j - Z_j$ row.

NOTE:

Generally in maximization problems we have all the constraints of less than or equal to. But still in a maximization problem, if we get equality or greater than constraint, then artificial variables will be used
In this case, artificial variables will be used in objective function with $-M$ coefficient. (minus M)