Simplex method example for Linear Programming: Maximize $Z = f(x,y) = 3x + 2y \longrightarrow 0$ Subject to $2x+y \le 18 \rightarrow 2$ $2x+3y \le 42 \rightarrow 3$ 1. Make a change of variables and normalize sign of the independent trans: X X₁ X₂ Y line both X, >,0 and x2>,0 is given, no further action is required at this stage. - enaplus + astificial Inequality type + ashificial
+ slack For inequalities (2), (3), (4), add slock variables X_3 , X_4 , X_5 , add slock variables become guations become X_3 , X_4 , X_5 , and X_5 , X_5 ,

Match the objective function to zero (or) $Z - 3X_1 - 2X_2 - 0X_3 - 0X_4 - 0X_5 = 0$ the original peoplem (ie; overfits of X, and X₂), and the slack (X₃, X₄, X₅). Then, enoplus and astificial variables are slack (X₃, X₄, X₅). Then, enoplus and astificial variables are added in second step (eg; po as constant team and variables), added in second step (eg; po as constant team and possibles).

P: \(\forall i = 1, 2, 3, 4, 5 \) as the coeffits of rest of X_i. variables

and constraints (in 90 us). let P, P, r, P5 be coefficients of the decision variables of First now => Objective function coefficients 3, 2, 0, 0, 0, and the Just now => objective function value and reduced coests Z-C, .

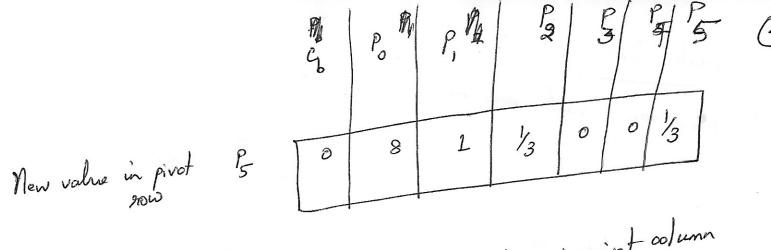
level now => objective

Table 1: Akaahion 1

	Tal	sk 1	•				P
	T C	TPo	P	P ₂	P ₃	P4	75
Base	Ь	18	2	1	1	0	0
P ₃	0	11	2	3	0	2	0
P	0	42			0	0	
P-	0	24	3	1			
5			-3	-2	0	0	0
Z		0	<u> </u>	1	4		

 $z_j = \sum_{i=1,2,\cdots,m} Z_i = \sum_{i=1,2,\cdots,m} Z_i$ Last grow:

Updale Table: In pivot now, each new value is calculated as Previous value New value = Pivot Q1 How to identify the Pirot row? - Divide Poby P, and find the minimum value. $\min \left\{ \frac{18}{2}, \frac{4^2}{2}, \frac{24}{3} \right\} = \min \left\{ \frac{9}{2}, \frac{21}{3}, \frac{8}{3} \right\} = 8$ De. - The value of the Z now which is must negative is the - So pivot now is P now Q2 How to identify the Pivot adumn? pivot solumn. 18 42 0 24 After this



For now P3, ne have: 0-2*0= $18 - 2 \times 8 = 18 - 16 = 2$ New value = New value = 2-2*1=2-2= New value = $1 - 2 * \frac{1}{3} = \frac{1}{3}$ ۴ : New value = 1-2*0=1 P2 : New verlue = 0-2*0=0 0-2*0=0 P3: New value = New value = P = P= =

 $0 - (2 \times 0) = 0$ Column New value = $42 - (2 \times 8) = 42 - 16 = 26$ C : New value = P. : 2- (2*1) = 0 New value = P, : New value 7/3 (How?) $3-\frac{2}{3}=\frac{7}{3}$ New value 0 (How?) 0-2*0 = 0 P : (How?) 1-2x0=1 P3 : $-\frac{2}{3}$ (How?) $0-2*\frac{1}{3}=-\frac{2}{3}$ P4: For now of, we have Table 2 devation =

$\begin{array}{ c c c c c c c c c c c c c c c c c c c$

	Tabl	e:	3'rd 3	ikeal 2	ion .0	0	0
Base	Cb	P	P	P	ρ 3	ρ 4	5
P ₂	2	6	0	1	3	0	-2
P (4	0	12	0	0	-7	1	4)
P	3	6	1	0	-1	0	1
Z		30	0	0	3	0	-1

		,	(6)
,	regalin	e val	ne.
not	consid	= -	3<0
			(min)
	6/1	= 6	

	Table	2 ,	4 i	Jerat	ion		1
			3	2.	0	P ₄	P ₅
Base	G	Po	P	P ₂	P ₃	1/2	0
$\frac{\frac{\rho}{2}}{\rho}$	2	12	0	0	-7/4	1/4	1
P 5	3	3	1	0	+3/4	4	0
P;		33 38	0	0	5/4	4	0
Z		2					7

STOP here eince all Z values are non-negative!

$$X_1 = 3$$
 $Z_{max} = 3X_1 + 2X_2$
 $X_2 = 12$ $Z_{max} = 3(3) + 2(12) = 9 + 24$
 $X_2 = 12$ $Z_{max} = 3(3) + 2(12) = 33$