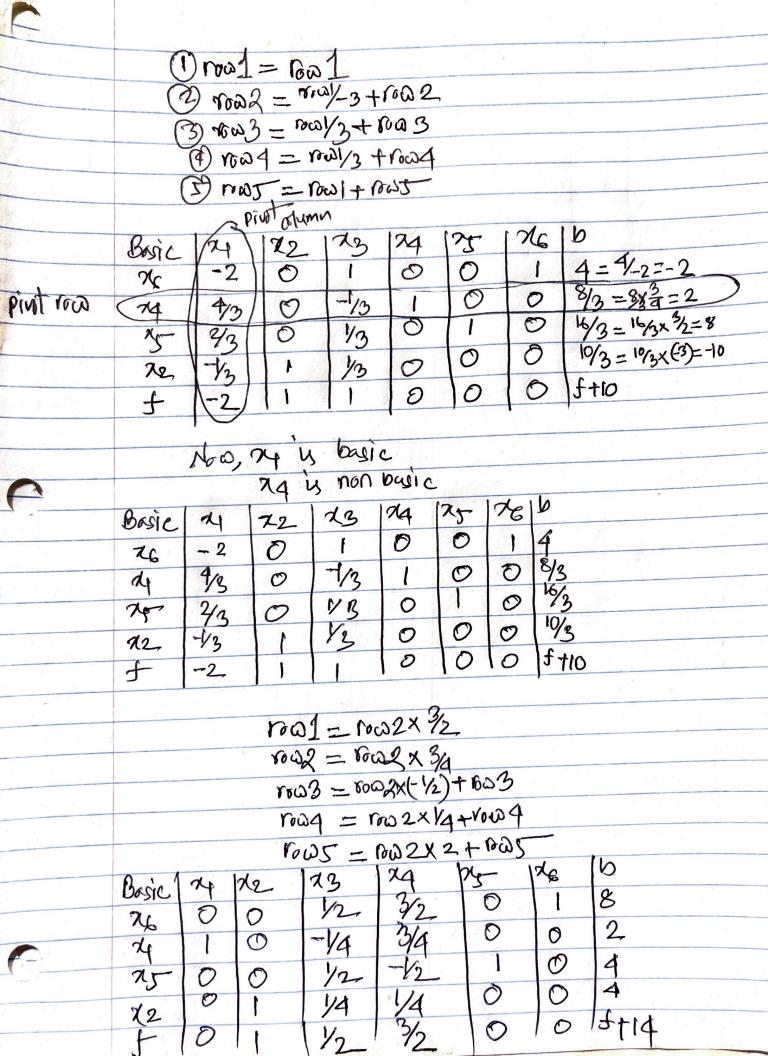
-Answer to Q(2) max = 2 = 21+212 S.t. - 21+3×2 < 10 4+256 74-1252 74+312 > 6 72,4710 1 let's convert the problem into standard LP problem, min 2 = -4-212 一74+312510 74+ 12 56 74-3×2 < -6 let's introduce some stock knowble 23, 14, \$75 & 26 to the inequalities 一74+312+23=10 7++12+74=6 71-72+75=2 -4-312+26=-6 Herre, non-basic variables arre = 24, 22 basic variables are = 23, 24, 25, 26 pint atumn 1st Tabkau? 23 Basic 21 126 10=1/3 t 23 O 0 0 24 6=6/1=6 0 0 00 0 X5 0 Phot 60 NE 0 0

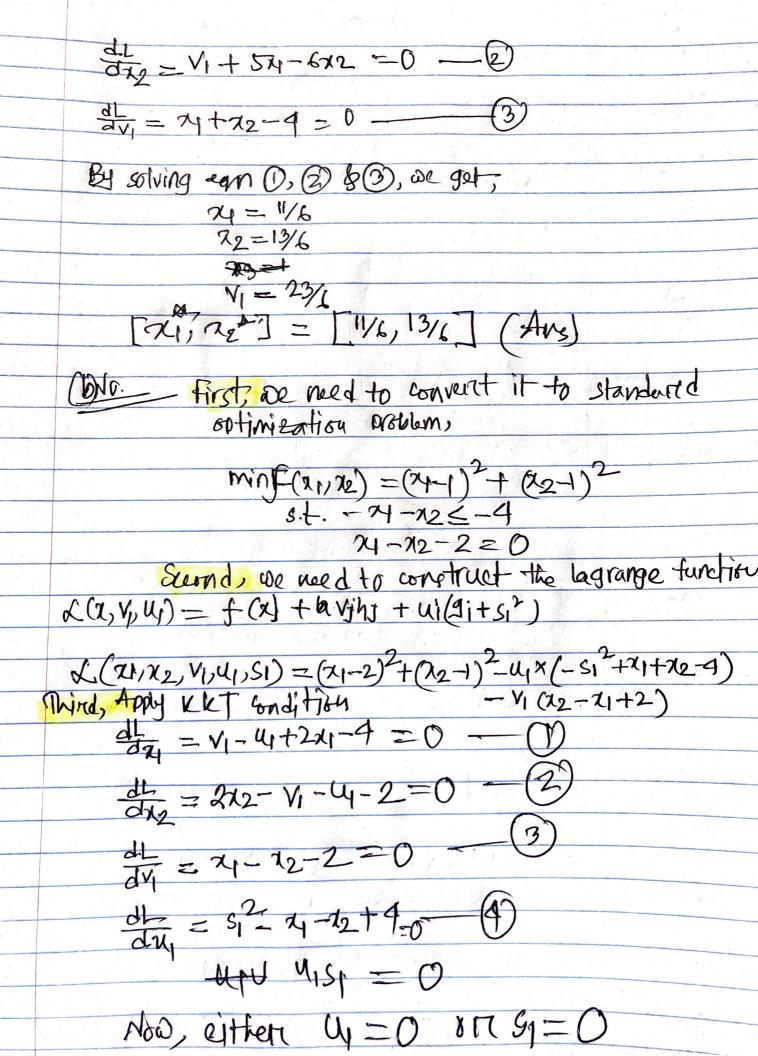
- 0										
	Now, to would be basic									
A .	& rewould be non basic									
	2						L 10	1		
2nd Tableau	Basic	121	72	13	124	25	-6	0		
2	73	1-1	3	1	0	0		ô		
	74	1		0	1	0		2		
	25		1-1	0	0	1	101	-6		
ter terminal	12	14	-3	0	0	0				
	+	17	-2	0	10	0	10	5		
(4) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1	rand=rant+row4									
	$r_0\omega 2 = r_0\omega 4/3 + r_0\omega 2$									
	202-104/3+1043									
		260	M =	- x604	x - 13		5.10			
		1 6	2w5 =	- YOW 4X	3+600	5	Plu	Humr		
			(1)					•		
	Buic	124	122	73	124	125	178	6		
protra	73	-2	0		0	0	A !	4=4=4		
PIVOLIVA	14	2/3	0	0		0	1/3	4=4x3=12		
	25	43	0	0	0	1	1-1/3	4=4x(-3)=-12 2=2x(-3)=-6		
		1/3	1	0	0	0	1-1/3			
	12.	0	1	0	0	0	1-1	7+6		
	J	1 0	•	1, 1,		9030				
		NW. a	L WOUL	1 00 h	osic					
	and as would be non basic									
	and is and is									
	n . 1	7. 1.	a d	3 24	125	128	b			
3rd Pableau	Basic	71 1		1 0	0	11	4			
	16	At a second	0		0	1/3	4	£ .		
	24	43		0 0	0 1	1-1/3	4			
	24	73	0		0 0	1-V ₂				
	72 +	1/3				1 -1	f+6			
	+	0		01	0 10		1 376			

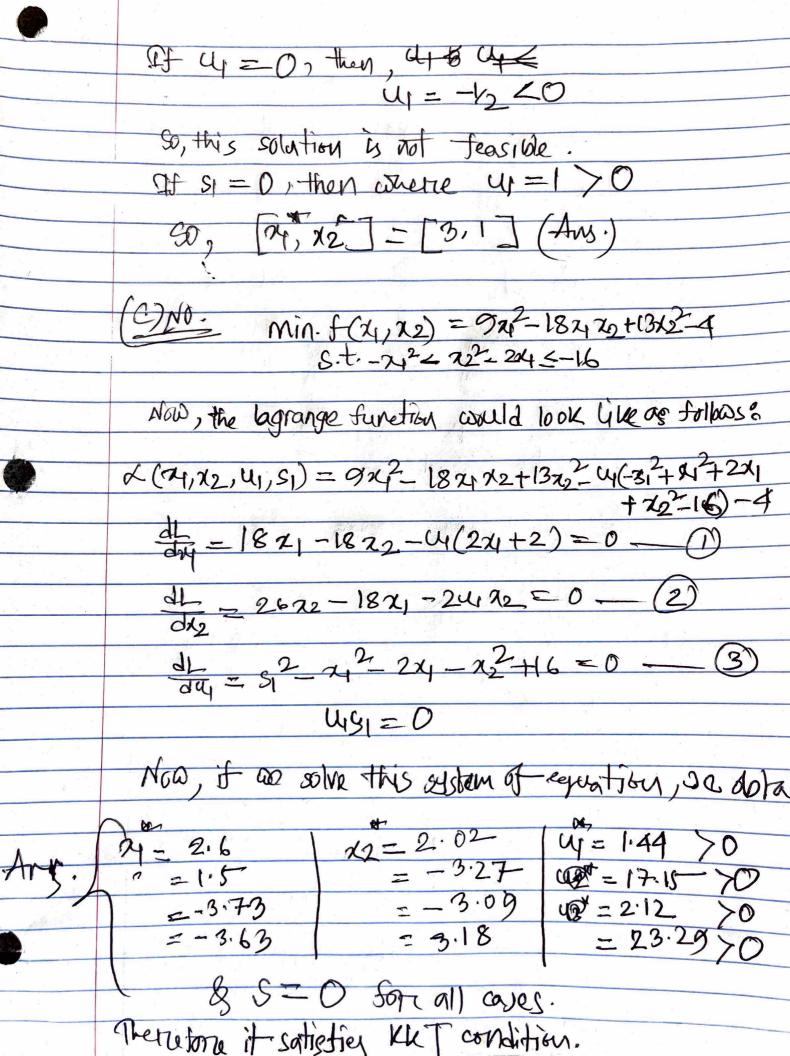


Naw, 23 & 24 are posic while therefore they are 100, 12 = 5 + 14=) 4 = 5 + 14=) 4 = -10Therefore, max 2 =+10 (4m.) Validation: The LINPROU() code is attached at the appendix. Answer to the Q(1) First, we need to convert it to standard optimization problem, minf (4,7/2) = -4x/2- 322+5x122+8 d.t. 4+12=4 Swoodly we need to construct the Lagrange function. $L(x,v)=F(x,x_2)+v_1(y_1)$ = $-4x^2-3x^2+5x_1x_2+8+v_1x(x_1+x_2)$

Thirdly, we need to apply the KKT condition

dy = V1-874+ 5x2 = 0 -(1)





Appendix

```
%% Problem 1 (a)
syms x1 x2 v1
expr1 = -4*x1^2-3*x2^2+5*x1*x2+8;
eqConstr = x1+x2-4;
LM1 = expr1 + v1 * eqConstr;
LM_x1 = diff(LM1, x1)
LM \times 2 = diff(LM1, \times 2)
LM v1 = diff(LM1, v1)
sol1 = solve([LM_x1,LM_x2,LM_v1], [x1,x2,v1], 'Real',true)
%% Problem 1 (b)
syms x1 x2 u1 v1 s1
expr2 = (x1 - 2)^2 + (x2 - 1)^2;
ineqConstr2 = -x1-x2+4;
eqConstr2 = x1-x2-2;
LM2 = expr2+v1*eqConstr2+u1*(ineqConstr2+s1^2)
LM \times 1 = diff(LM2, \times 1)
LM \times 2 = diff(LM2, \times 2)
LM_v1 = diff(LM2, v1)
LM_u1 = diff(LM2, u1)
sol2 = solve([LM_x1,LM_x2,LM_v1,LM_u1], [x1,x2,v1,s1], "Real",true)
%% Problem 1 (c)
syms x1 x2 u1 s1
assume(u1 >= 0)
assume(s1 >= 0)
expr3 = 9*x1^2-18*x1*x2+13*x2^2-4;
ineqConstr3 = -x1^2-x2^2-2*x1+16;
LM3 = expr3+u1*(ineqConstr3+s1^2)
LM \times 1 = diff(LM3, \times 1)
LM \times 2 = diff(LM3, \times 2)
LM_u1 = diff(LM3, u1)
LM s1 = u1*s1
sol3 = vpasolve([LM_x1,LM_x2,LM_u1,LM_s1], [x1,x2,s1,u1])
%% Problem 2
A = \begin{bmatrix} -1 & 3 \end{bmatrix}
    1 1
    1 -1
    -1 -3];
b = [10 \ 6 \ 2 \ -6];
f = [-2 -1];
[x,fval] = linprog(f,A,b)
```