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GROUP	WORK	A L		PRINCE ((1) (101)
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leads towards an optimal solution.

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in Describe Gradient sourch procedure for a multivariate unconstituted maximization problem and give a colved example mothering allahous ind contribut both hames The aim of Gradient search is to reach point where all the partial derivatives are 0.

The values of the partial derivative are used to select the specific direction. The gradient of point X = x is

Df $(x) = (\frac{\partial f}{\partial x}, \frac{\partial f}{\partial x}, \dots, \frac{\partial f}{\partial x})$ at x = xOne direction of the gractient is interpreted as the direction of the directed line segment from the origin to the point. Example: x (a) (a) (b) (a) (a) (a) (a) max $f(a) = 2x_1 x_2 + 2x_2 - x_1^2 - 2x_2^2$ 5 47715 CHS65 12 4665 ALBERTA DIGTORI-Solution of Exercise MITAPICS TOTAL TOTAL df = 2x2 - 2x1 df = 2x, + 2 - 4x2 2×2 Choose x = (0,0) Df (0,0) = (0,2) 402 x1 = 0++(0) = 0 X2 = 0+t(2) = 2t

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f(x1 + + Df (x1)) = f(0,2+) 1 about - when have down (in
 f(x) = a(0)(at) + a(at) - 0^2 - a(at)^2
   on= 4t-8t2 (x) cp, (a) a, (a) 4 bout commerce unit
                              differentiable functions
 f(0,2t^*) = \max_{x \in X} f(0,2t)
= max f4t - 8t<sup>2</sup>}
              Describe how to solve the KKT Condition.
 dk (4+-8+2) = 4-16+=0
                            molding not remaining prof
     4=16t t=1/4
 Recet x 5(0,0) + 4 (0,2)
                             L=fa) + Ekgi(x) .
 X1 = 0, /2
- The gradient Af (0, /2) =(1,0)
 x=(0, %) + t (1,0) =(t,6)
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 f(x'+t\Delta f(x')) = f(0+t, \%+ot)
-f(+,1/2)
 =(2+)(6) + 26) - +2 - 26)^2
 f(t^{1}, t_{0}) = \max f(t, t_{0}) + 770
= \max \{t - t^{2} + t_{0}\} 
= t_{70} 
 d (t-+2+1/2) = 1-2+=0
     2/2t = 1/2 t = 1/2
                                             Maiso
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This assumes that $f(a)$, $g(x)$, $g(x)$, $g(x)$ $g(x)$ are differentiable functions: $x''' = x''$, x'' an be optimal solution for the non-linear programming problem only if there exist in number $M_1, M_2 \dots M_m$. Describe how to solve the kkt condition. The a maximization problem: Max $f(x)$ Subject to $g(x) \leq 0$ $L = f(a) = E \land g(x)$ $h(g) = D$ $g(x) \leq 0$		1) = - Po - (PD) + (PA) (6) = (M)
$x^* = x_1^*$, x_2^* x_n^* an be optimal colution for the non-linear programming problem only if there exist in number x_1 that x_2 there exist in number x_2 that x_2 there exist in number x_2 that x_2 there exist in number x_1 that x_2 there exist in number x_2 that x_2 the exist in number x_2 that x_2 there exist in number x_2 that x_2 there exist in number x_2 that x_2 there exist in number x_2 that x_2 then x_2 that x_2		$g(x), g(x), \dots, gm(x)$ are
non-linear programming problem only if there exist in number $M_1, M_2 = M_1 = M_2$. Describe how to solve the KKT condition. There a maximization problem: Max $f(x)$ Subject to $g_1(x) \leq 0$ L= $f(x)$ = E $f(x)$ =	A	
Describe how to solve the kkt condition. Tor a maximization problem: Max $f(z)$ Subject to $g_1(x) \leq 0$ $L = F(x) - E \land g_1(x)$ $h_1g_1 = 0$ $g_1(x) \leq 0$ $h_1 \neq 0$ For a minimization problem! Min $f(x)$ Subject to $g_1(x) \neq 0$ $dx = 0$	x = x, , x2 xn	can be optimal solution for the
Describe how to solve the kkt condition. The a maximization problem: Max $f(a)$ Subject to $g_1(a) \leq 0$ $L = f(a) - E \wedge g_1(x)$ $A_1 g_1 = 0$ $A_1 g_2 = 0$ $A_1 g_3 = 0$ For a minimization problem! Min $f(a)$ Subject to $g_1(a) \neq 0$ $A_1 \neq 0$ $A_2 \neq 0$ $A_3 \neq 0$ $A_4 \neq 0$		
Describe how to solve the kkt condition. Tor a maximization problem: Max $f(x)$ Subject to $g_1(x) \le 0$ $L = F(x) - E \times g_1(x)$ $A = 0$ $A =$	Millia Hm.	
For a maximization problem: Max $f(z)$ Subject to $g.(x) \le 0$ $L = F(x) - E \land g.(x)$ $\delta L = 0$ $\delta \lambda$ $A.g. = 0$ $g.(x) \le 0$ $A. 7.0$ For a minimization problem! Min $f(x)$ Subject to $g.(x) \ne 0$ $\delta L = 0$ $\delta \lambda$ And $\delta L = 0$ $\delta \lambda$	h	
For a maximization problem: Max $f(x)$ Subject to $g_1(x) \le 0$ $L = F(x) - E \land g_1(x)$ $\frac{\partial L}{\partial x} = 0$ $A_1g_1 = 0$ $g_1(x) \le 0$ $A_1g_2 = 0$ $A_1g_3 = 0$ $A_1g_4 = 0$ For a minimization problem! Min $f(x)$ Subject to $g_1(x) \ne 0$ $\frac{\partial L}{\partial x} = 0$	Describe how to solve Th	
Max $f(z)$ Subject to $g_1(z) \leq 0$ $L = f(a) - E \land g_1(x)$ $\frac{\partial L}{\partial x} = 0$ For a minimization problem! Min $f(z)$ Subject to $g_1(z) \neq 0$ $\frac{\partial L}{\partial x} = 0$	To a houseman to 11	0= 101-11 = (2+0-14) in
Subject to $g_1(x) \le 0$ $L = F(x) - E \land g_1(x)$ $\frac{\partial L}{\partial x} = 0$		
L= $f(\alpha)$ - $Ehg_1(x)$ $\frac{\partial L}{\partial x} = 0$ $\frac{\partial L}{\partial x} = 0$ $h_1g_1 = 0$ $g_1(\alpha) \leq 0$ $h_1 \neq 0$ For a minimization problem! Min $f(\alpha)$ Subject to $g_1(\alpha) \neq 0$ $\frac{\partial L}{\partial x} = 0$		40-4
$\frac{\partial L}{\partial x} = 0$ $\frac{\partial L}{\partial x$		1001 N + 1 - 575 1 0
As $g_1 = 0$ $g_1(x) \le 0$ $h_1 \ne 0$ For a minimization problem! Min $f(x)$ Subject to $g_1(x) \ne 0$ $dx = 0$		
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For a minimization problem! Min $f(x)$ Subject to $g_1(x)$ 70 $dL = 0$ dx Mig'i = 0	NI // U	
Min $f(\alpha)$ Subject to $g_1(\alpha)$ 70 $dL = 0$ $d\alpha$ Migi=0	Enc a minimization public	
Subject to $g_1(x)$ 70 $\frac{\partial L}{\partial x} = 0$ $\frac{\partial R}{\partial x} = 0$ $\frac{\partial R}{\partial x} = 0$ $\frac{\partial R}{\partial x} = 0$		
$\frac{\partial L}{\partial x} = 0$ $\frac{\partial R}{\partial x} = 0$ $\frac{\partial R}{\partial y} = 0$ $\frac{\partial R}{\partial y} = 0$	Subject to g. (a) 7,0	7 024
$\frac{\partial L}{\partial z} = 0$		00 te-10 /21.81 17 b
Aigi=D	dL =0	
		7/=1 N=1/2
	Nigi =0	

Use KKT 258-828+ 123-528 - CORCUSAL AIM CO	
Max f(x,, x2) = 152, + 302, + 42, x2 - 22,2 - 4222	
Subject to: 2x, + 2x2 4 36	
$x_1 x_2$ $7/0$	
another text and there	
fi = 2 bihi	
Isl Os while	
hihi =0 02 14	
hi 7/0	
hi 70 anothers whenever	
let f = 15x1 + 30x2 + 4x1x2 - 2x12 - 4x22 (2xx)	
h. (a) = 221+2x2-30 (2-1) (2 (ex. 1))	
= h. [221 + 222 - 30]	
1521 + 3020 + 42120 - 2212 - 4202 = hi [2x, +2x2 -30]	
Differentiate son more up ant will	
d = 15 + 422 - 421 = h [2] (i)	
8×1 = 3+1= 0 = 1+ 1= - 1×10= 1	
$\frac{d}{d} = 30 + 421 - 822 = 261 - (ii)$	
das times tomos	
12 sx+xx	
hi=0 4x45-420=-15x	
-422 = -45	
	•
$-2(15)^2-4(11.25)^2=281.25$	
THE PARTY OF THE P	Max $f(z_1, x_2) = 15z_1 + 30z_2 + 4z_1x_2 - 2x_1^2 - 4z_2^2$ Subject to: $2x_1 + 2x_2$ 30 x_1x_2 y_0

Subject to: - 2, +22 51	Mr f(x, x2) = (6x, x) 7 mm	
	250 + 150 cat + 101 du 2	
035		
Obtain the KKt conditions		
fi = & Kihi	12.0 E = A	
hih =0	isi	
h, 50	os idid	
hi 7/0	h 20	
Stationarity Conditions	W 70	
	=0 x+ + exx + x21 = 1 fot	
Of (x1, x2) = (2 61-6)	h. (a) = 21+112-30	
√g (x1, x2) = [!]	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
	(a) what ' =).	
(21,-6) + $L(1)$ = 0	Eas - 656 + 1567 1/4 = 1	
(3/52-3		
	1521 + 2020 + 42120 - 221	
Thus the equation are:	gho'd market	
ax, -6+L (=0 - 12)	1 = 1×4- = +×1 = 1	
$30(2^2 - 3 + L) = 0$	1 = 124 - 224 C = 12 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
(f) As	3 = 30 + HX - 8x2 =	
Primal feasibility:	6.00	
x, + x2 <1		
X1, X2 7/0	0.014	
25 25 e , r.g.	15 1432 × 471 20	
Dual feasibility	423 - 4x1 = -15	
L7,0	08 = 154 + 458+	
	24 24-	
Complementary	+	
Lg (x1/12)=0	72 - 11.25	

use the kkt to check whether Co	x, 12) = (1/2, 1/2)
2 (/a) -6+ L=0	eddinal for in one
1-6+L =0	
L=5	Ox 1 1
$3(1/2)^2 - 3 + L = 0$	le de x
$\frac{3}{4} - 3 + L = 0$	mortulatedus Appront
9 +4 =0	1= 5/4 1/2
4	ex-1=-,1
L=5	0= 4+2- (ex-1)c
-9 + 5 = 0 (ii)	350°-346 00
4	
0=4	35 242 6+L co .
hus stationary condition with	
Histyling the KKT Condition.	13x2-8+6 =0 . (1)
	4+28=1
se kkt condition to denve an	
tationanty condition 21, -6+1	
	+L = 0 00 (11) 0 + fexs
omplementary L (1,+x2+1) = 0	
Primal feasibility XI + X2 50	sas - b I V ba- HAC
X1X2 7,0	0.2
Dual feasibility 170	To a -a t VIII-la
	9
L=0	est 40 reallow low on
Then $2x, -6 = 0$ $x = 3$	
$3\chi_{2}^{2}-3=0$ $\chi_{2}^{2}=1$: 2a= 10r -1
Thus (21,2(2) = (3,1) or (3,-1)	
(A) (A) (A) (A)	
Substituting XI +X2 <1	
3+1 = 471	
3-1 = 271	

caso as not feasible.	2 (B) - 6+ L = 0
laste as they leavible.	
W 1 ~ 0	0= 1+3-1
4 h 7/0	9=1
X, +X2 =1	3(k) - 3+5=0
Through Substitution	0=1+8-16
$\chi_1 + \chi_2 = 1$	0= 44 8
$x_1 = 1 - x_2$ $x_1 = 1 - x_2$ $x_1 = 1 - x_2$ $x_2 = 1 - x_2$ $x_3 = 1 - x_2$ $x_4 = 1 - x_2$	2
all the	5=7 4
$3\chi_2^2 - 3 + L = 0 \cdots (ii)$	0=24/-
77 01 0	₹! = d
2×2×2 6+L=0	7
-2x2 -4+6 = 0 4 (i)	
3×22-3+4 -= 0. (ii)	Satisfying the KET and
L=2x2+4	
institutes brings as exact	of nothboar 131 9211
$3x^2 - 3 + 2x_2 + 4 = 0$	
3x2 + 2x2+1=0	X6
0 c (#.	Complementing L William
x2=-b + 1 b2-490	- Prince (Carentite Xx+
29	2×1× ;
X2 = -2 + T4-12	Dud frontify Leo
6	
no real values of the.	0 = 11
	They 230-600 2,
1- 101 sac 1 = \$x	
	10 (he) = (xx,x) m)
	12 ext 1x partitions2
	4 = 1+8
	3-1 = 23