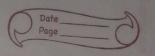
Conver Optimization
C2 Review Test Page\_ Name: Raushan Raj Roll No:- 11T2018032 Answers Quest Sol? The equation of dual problem are as follows: 24-342-71=2 7, +y2 - N2 = 16 - y, +2y - n = 2 Now, given the values of Il, Its and Ils. Here, first of all we calculate the value of the slack variables of and by. The folition needs to be feasible in order to optimal In this case that means the decision and slack variables, all should be greater than or equal to zero. Next, it, it is optimal whenever andij or i is non-zero. Now complementary blackness days the that what's left of the equation of the dual when those variables are bet of . too. If we can find a solution that it is flasible, then we conclude the alleged solution is optimal. If there's not a feasible polition, it isnot we shall discus with case A for solution to be feasible all decision

1172018031 1 st case > with x = 6, x2 = 0 and x3 = 12 therefore it is not optimal. 2nd case -> with x, =0, x, =2, x, =5, s, =0 I the solution of the primar is feasible. From complementary slackness, n = 0 and nz o. So, the equation of dual become 2y-3y-n=2-0 01+12=16-(11) 1 + 2 y = 2 Now from theored and 3rd, y = 10, 4256 and then from the first in 20-2) All 20. Hence the solution of the dual is peasible. Case? is pearible and optimal as Case 3 with x, 20, x, =0, x, =6, S, = 3ª and = So To. Then the solution of primes is feasible. From Complementary Slackness, nz =0 and y 50. So the equation of dual become as follow:  $-37_{2}-n_{1}=2-(11)$ +242 =2 (V1)

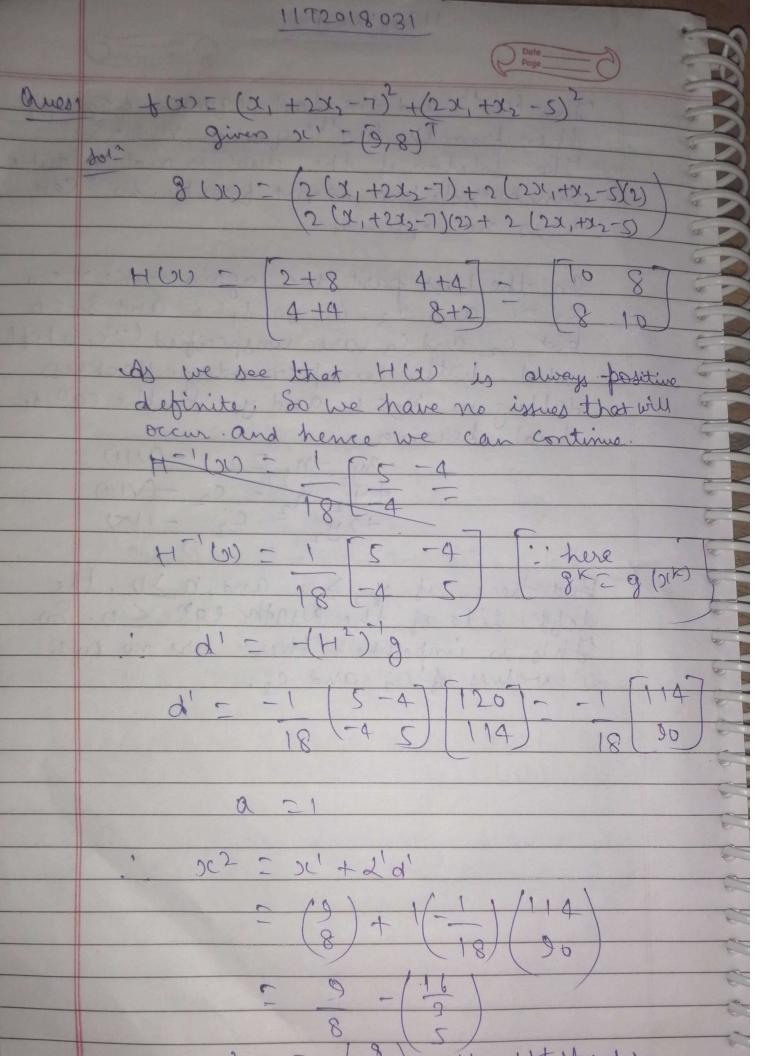


The With and the last equation says of 21 then from the (w)the quation n = -5.
The solution of the dual is not peasible Since Solution is not peasible, so Case 3 is not optimal.

In the last part, we again take 1, 00 DC, =0 and 23=6, so 3,=3 and so=0 but companied (in kept cate). With complementary slackness telling us no=0 and y=0. The eqn of dual becomes

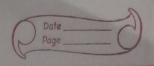
-3y-n, -2 - (VII) +y2-n - (2 - (VIII) +2y - (3 - 11x)

But here if y > 0 and n, 10. the left side of the N19th egr < 0. So This is impossible. There are no such values of c2 and c2.



1172018031 As g'(x) =0, for only one value that is one more iteration. So, Here we go.

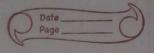
de - (Hx)-1 g2 23 = x2 + R2 d2 we got x3 = 11 Also, 9(13) =0 and H (03) is positive definite Hence 313 is local minima (1) After 2 iteration using newton's method, my function returns the optimal value (minimum Yes, the minimum is the global minimum as gor is a linear equation that can only have one hoot.



Ques3 KKT Condition Criven genera problem min of los Subject to h; (0) 30 ; i=1...n X, KKT Condition are · (Stationarity) li hip) = 0 + i (complementary sleickness) hild 50, 1: UDEO + i, i (primes feail that =) M; >0 & 1 ( dual feasibility) Necessity If it and un", v" are plimed and dual and with o duality gap then x", u" v" satisfy under KKT Condition If I and he & Satisfy the KKT condition than x", u", v" are primer and duel fortation. In Jummay, KKT Condition remains -1) always sufficient (1) sera necessary under strong

1172018031 Continue down's Sol's up we see in newton step for minxep from Subject to Arch This is convex problem, so no inequality Constraints. So by KKT condition a is a solve it and only it FQ ATTXT For some u. Linear system combines Stationery Stationarity, plimal feasibility. Stationery Condition can be obtained by

Tx 1(x,v) =0 Using derivative properties Jax+b+ATV=0 Primal feasibilitys AX =0 Stationerify Condition and primes of easibility can be compined and



Ques do!? If A has negative eigen value

if 0 > 0 > Unique globel solution XK+1 = XK- LXX (UK) To find dx \( \dagger \to minimize \dagger \left( \dagger \dag = 1 (x-27f(xx)) a (xx-27f(xx)) -b (xx-7f(x)) we can see g(d) is quadoratic and g(d) - a 2++ d2+c =) min (g(2)) toill be at -d a= 1 7 f (2/k) Q7 f (1/k) d= (b - x a) 7 + (xx) ニーマが(スル)マナ(スル) =) dx = Vtranxton THE (IN) DT + (IK) where Pf(xx)= 201x-b