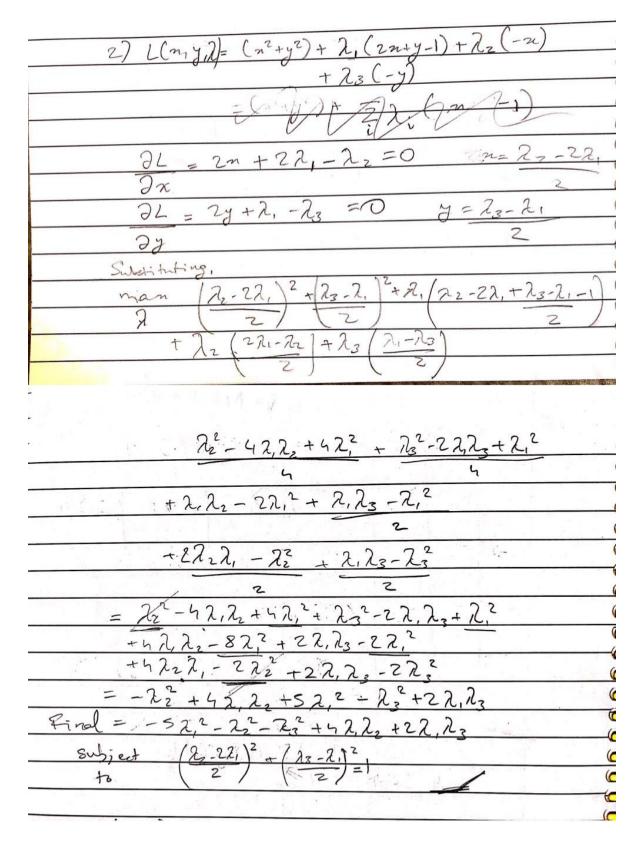
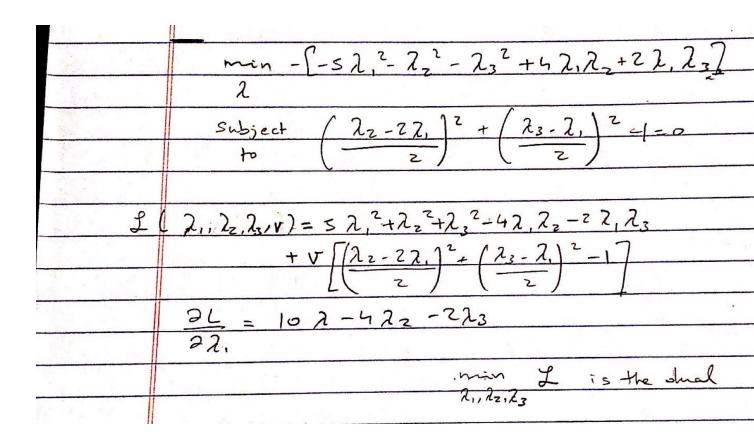
[Special Topics] Homework 2 Sudarshana Jagadeeshi CS 4301.001

## 1-1.

Slaters condition states that the inequality constraints must be satisfied strictly. (0.25, 0.25) accomplishes this as 2(0.25)+0.25 < 1, 0.25>0, and 0.25>0.

1-2





2-1
The gradient w.r.t to each lambda\_i is: (q-sum) \* x(i)

 $\underline{\text{https://colab.research.google.com/drive/13gxjrX9OcVPcd1ZwUCdDYuycRGSAJ8sO?usp=sharing}}$ 

2-2

J	(2, v, u) 1 / o - 2 2m 2 cm) 1/2
	en ineq $+\sqrt{\sum_{m=1}^{M} 2m} - 1 + \frac{\pi}{2} \frac{1}{2} 1$
	L m=1 / C Mm m
<u> </u>	2L= - 1   q-n(x)  2+++ 1/4 =0
	22k
ii .	= 1 (-22090
	(9-202)2+(9-2,2,)2+"+(9-2m2m)2
	9,52-27,020,9, -22020
	-2 2090 +2 20 202 +v+MK=0
	2 200 = 22090 - 11 × -11 × 2 2002
	2 26 2
I(2, v, u) = = 2 / 9- = 22m9m-V-Mm/2	
m=1 22m²	
+ V [ m ]	
+ V [ m 2 m q m - V - M m - 1]  Z 2 m m 2 m m 2	
$+\frac{M}{2}Mm = 2nmqm - V - Mm$ $m=1$ $2nmq^2$	
L	

3-1 Probably not. The function is not smooth, and there is no neighborhood around a point, so the derivative will not exist.

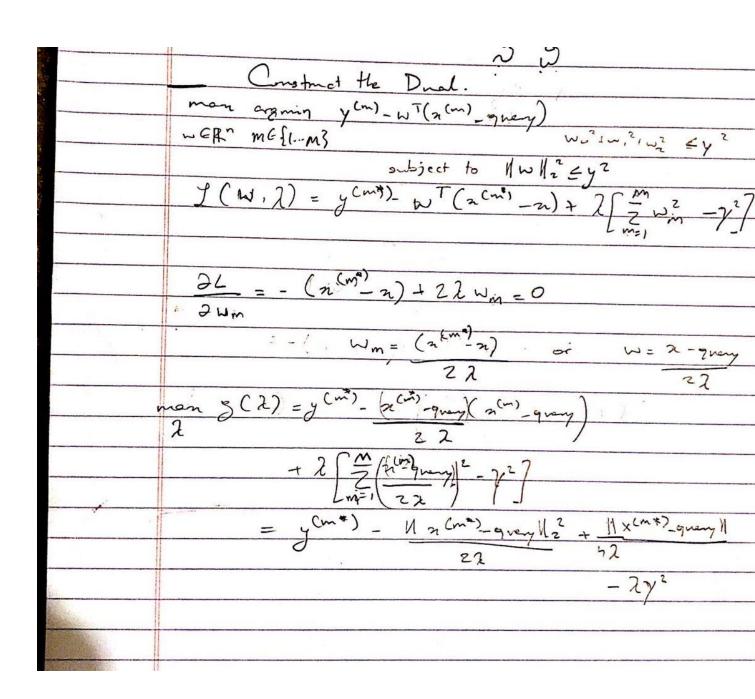
It ceases to be a subgradient when w takes sufficiently large values. It will no longer underestimate data point y(m).

3-2-b

Rewrite the constraint in order to eliminate the y. The problem then becomes: maximize over w(argmin over points(y(m)- wT (x(m)-x)) i.e. we must find the optimal point first and then optimize over w for each iteration.

 $\underline{https://colab.research.google.com/drive/1WIUCNled6KcgJk\_OqXxrDkGdy\_U4BZgZ?usp=sharin} \ \, a$ 

3-2-c



3-2-d <a href="https://colab.research.google.com/drive/1D0gUWAxJpealGwmBKLkZ1K9WR5ndePfq?usp=sharing">https://colab.research.google.com/drive/1D0gUWAxJpealGwmBKLkZ1K9WR5ndePfq?usp=sharing</a>