

Lecture 7

a) Find candidate functions via KKT conditions

Variables

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$x_1, x_2, \lambda, y_1, y_2, y_3, \mu \geq 0$

$$f(x) = x_1^2 + 2x_2^2 \quad \text{s.t.} \quad \begin{cases} x_1 + x_2 = 1 & x_1 \geq 0 \\ x_2 \leq 0.5 & x_2 \geq 0 \end{cases}$$

$$\nabla f(x) = \begin{bmatrix} 2x_1 \\ 4x_2 \end{bmatrix}$$

equality constraint

$$x_1 + x_2 - 1 = 0$$

inequality constraints

$$x_1 \leq 0.5$$

$$x_1 \geq 0$$

$$x_2 \geq 0$$

if active inequality

$$x_1 y_1 = 0$$

$$x_2 y_2 = 0$$

$$(-x_1 + 0.5) y_3 = 0$$

$$C^T \mu = 0$$

then make KKT to check

$$\nabla f - \nabla_a^T \lambda - \nabla_c^T \mu = 0$$

2 equations

1st scene

$$x_1 = 0$$

$$x_2 = 0$$

2nd

$$x_1 = 0$$

$$x_2 = 1$$

3rd

$$x_1 = 0.5$$

$$x_2 = 0.5$$

4th

$$x_1 = \frac{2}{3}$$

$$x_2 = \frac{1}{3}$$