SSY281 Model Predictive Control

Micro-homework 6

Optimization Basics and Convexity

Deadline: February 12, 10:00

Systems & Control
Department of Electrical Engineering
Chalmers University of Technology

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Instructions

This assignment is **individual** and must be solved according to the following rules and instructions:

- Written report:
  - It should be one page with pdf format.
  - The report should be uploaded *before the deadline* to your project document area in PingPong.
  - Name the report as MA6_XX.pdf, where XX is your *group* number.

Question 1. *For a generic unconstrained optimization problem, what is a necessary condition for x^* to be a solution?*

Question 2. *Are the KKT conditions necessary and sufficient optimality conditions for any type of constrained optimization problem?*

Question 3. *Write the Lagrangian for problem 40 in slide 69.*

Question 4. *Consider the following optimization problem*

$$\begin{aligned} \min_{x} \ & (x_1^2 + x_2^2), \\ s.t. \ & x_1 \leq 0, \\ & x_1 + x_2 = 1. \end{aligned}$$

Graphically solve the problem. Write the KKT conditions and show that they hold at the solution you have found with the graphical method.