SSY281 Model Predictive Control

Micro-homework 9

Stability

Deadline: February 22, 10:00

Systems & Control
Department of Electrical Engineering
Chalmers University of Technology

February 2019

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 MA9_XX.pdf, where XX is your *group* number.

Question 1. *Give the definition of local stability for a generic dynamical systems. What does it mean?*

Question 2. *What is the difference between local and global stability? Is the system* $x^+ = 0.3x + 5u$ *locally or globally asymptotically stable?*

Question 3. *Find a Lyapunov function for the system in the previous question.*

Question 4. *List the tuning parameter in a RH controller that closed-loop stability depends on.*

Question 5. *The closed-loop stability of a RH controller is achieved by choosing the terminal set as a control invariant set and the terminal cost as the optimal cost-to-go of the corresponding unconstrained LQ controller. Can you provide an intuitive explanation of this?*