

EECS 291E: Hybrid and Intelligent Control Systems Design

Homework 2: Executions of Hybrid Systems Spring 2020

Assigned Feb 12th, Due February 24th 11:59 pm.

Problem 1: Regularization of the Zeno execution of the water tank

Please do Problem 3.12 on Pages 62, 63 of our textbook [1] with the spatial and temporal regularizations of the water tank example.

Problem 2: Checking Specifications of Hybrid Systems

Please do Problem 4.9 on page 88 of our textbook [1] to get the \square, \diamond properties verified.

Problem 3: Timed Automata

Please do Problem 4.7 on page 87 of our textbook [1] for the timed automata of Figure 4.4.

Problem 4: Finite Bisimulation of Timed Automata.

Prove or correct the formula:

$$n! 2^n \prod_{i=1}^n (2C_i + 2)$$

for the number of regions in the region graph (Figure 4.3) for the finite partition on page 81 of our textbook [1].

Bibliography

[1] John Lygeros, Shankar Sastry, and Claire Tomlin, *"Hybrid Systems: Foundations, advanced topics and applications"* Feb. 1 2012