Exercise Sheet 5
Early submission: Tuesday, 2013-07-21, 10:00  Regular submission: Wednesday, 2013-07-22, 10:00

Exercise 1: Region Construction [2]  (10/20 Points)

Consider the timed automaton $A$ in Figure 1. In the tutorial, we had the impression that locations $\ell_2$ and $\ell_3$ are not reachable. Prove this statement by constructing the region automaton.

Hint: you need not present all configurations of $R(A)$ if you explain appropriately why those, which you do present, are sufficient.

Figure 1: Timed Automaton for Exercise 1.


Compute $\text{Post}_e(\ell_0, z)$ for the zone $\varphi_0$ given by Figure 2 and for both edges originating at $\ell_0$; give the intermediate steps up to $\varphi_5$.

What can you conclude about the reachability of $\ell_1$ and $\ell_2$?

You may represent zones graphically or symbolically.

Exercise 4: Deadlock  (5/20 Points)

(i) Please give (possibly from (correctly cited) literature) an exact formal definition of deadlock in Uppaal [1], i.e. please explain (formally) using the notions and definitions from the lecture when exactly a network of timed automata satisfies

$$ E <\!\!\!>_{} \text{deadlock.} $$

Consider the following examples:

a) $\bigcirc$
Do they have a deadlock according to your definition? And according to Uppaal (i.e., what does Uppaal’s deadlock check yield)? (3/5)

(ii) How does deadlock relate to timelock? (1/5)

(iii) What is checking for deadlocks good for? (1/5)

References
