Advanced Model Checking
Summer term 2014

– Series 5 –

Hand in on May 21'th before the exercise class.

Exercise 1 (7 points)

Let $CTL\backslash_U$ be the subnlogic of CTL that does not premit the until operator. Similarly, $CTL^*\backslash_U$ means CTL^* without U. Which of the following statements are correct for finite transition systems.

  a) $CTL\backslash_U$ equivalence is finer than $CTL\backslash_\bigcirc$ equivalence.

  b) $CTL\backslash_U$ equivalence is finer than divergence-sensitive stutter trace equivalence.

  c) $CTL\backslash_\bigcirc$ equivalence is finer than $LTL\backslash_\bigcirc$ equivalence.

  d) Divergence-sensitive stutter bisimulation equivalence is finer than $CTL\backslash_U$ equivalence.

  e) Stutter trace equivalence is finer than $CTL\backslash_U$ equivalence.

  f) For AP-deterministic transition systems, stutter trace equivalence is finer than trace-equivalence.

  g) For AP-deterministic transition systems, trace equivalence is finer than $CTL^*\backslash_U$ equivalence.

Exercise 2 (3 points)

Consider the transition systems T_1 and T_2 in Figure .

  (a) Show that $T_2 \preceq T_1$ by providing a simulation relation for (T_2, T_1).

  (b) Show that $T_1 \npreceq T_2$ by providing a $\forall CTL$ formula $\Phi_\forall$ and a $\exists CTL$ formula $\Phi_\exists$ such that $T_1 \not\models \Phi_\forall$, but $T_2 \models \Phi_\forall$ and $T_1 \models \Phi_\exists$, but $T_2 \not\models \Phi_\exists$.