

CS 720, Fall 2016
Homework 2

Due Date: September 28

1. Baier and Katoen, Exercise 2.1b.
(This problem asks you to compute the synchronous product of two circuits. You already computed their transition systems on Homework 1.)
2. Baier and Katoen, Exercise 2.12.
(This problem asks you to model an algorithm with a channel system.)
3. For the transition system in Baier and Katoen, Exercise 5.1, give all the traces of the transition system and all the finite traces.
4. Let $AP = \{A, B\}$. For each of the following descriptions of a property, formulate the property as an LT property. If the property is an invariant property, give an invariant condition for the property.
 - (a) A is always true.
 - (b) A is true exactly once.
 - (c) Whenever A is true, B is true at the same time.
 - (d) Whenever A is true, B is true at some later point.
5. A linear time property is a set (of infinite sequences of sets of atomic propositions), so it makes sense to talk about the union, intersection and complement of two linear time properties.
 - (a) Prove that the invariant properties over AP are closed under intersection, in other words, if E_1 and E_2 are invariant properties, then so is $E_1 \cap E_2$.
 - (b) Prove that the invariant properties are not closed under union. (This means that you have to give two invariant properties whose union is not invariant.)
 - (c) Explain why the invariant properties are not closed under complement. (This follows from Parts (a) and (b). You can get credit for this part even if you couldn't do Part (b).)