Tutorial 9

1. Model one counter with zero tests using CCS language with a finite alphabet.
2. Let (N, M_0) be a net generated for formula ϕ using the reduction from CNF-SAT problem to non-liveness in free-choice Petri nets (see Problem 4 from Tutorial 7). Prove that if (N, M_0) is not live, then ϕ is satisfiable.
3. Construct two counterexamples proving that the Commoner's theorem does not hold for general Petri nets (that are connected and have all arc weights equal one).
4. Show that reachability problem for Petri nets with resets is undecidable.
   Hint: Reachability for two-counter automata with zero tests is undecidable.
5. Prove that non-liveness problem is reducible to reachability in Petri nets.

Homework (not mandatory)

1. Construct the second counterexample for Problem 3.
2. Try to solve Problem 5, then read the provided solution.