

Modeling Concurrent and Probabilistic Systems

Winter Term 07/08

– Series 4 –

Hand in until November 16 before the exercise class.

Exercise 1 (6 points)

Give a CCS definition for a *stack* over two data items a and b !

Hint 1: Employ the sequential composition operator from Exercise 3.4.

Hint 2: The process definition for your stack needs not to be *well terminating*, however!

Exercise 2 (4 points)

Prove that it is undecidable whether a given CCS process definition induces a finite or an infinite transition system.

Hint: a turing tape can be simulated by means of two stacks.

Exercise 3 (4 points)

Employ the partition algorithm as discussed in the lecture to show that the two specifications of the two place buffer are not strongly bisimilar.

Exercise 4 (4 points)

Show that for processes $P, Q \in \text{Proc}$, the chain of inclusions

$$P \sim Q \implies P \simeq Q \implies P \approx Q$$

between strong bisimilarity, observational congruence and weak bisimilarity are proper. To this aim, give examples for processes $P, Q \in \text{Proc}$ such that

- a) $P \simeq Q$ and $P \not\sim Q$,
- b) $P \approx Q$ and $P \not\simeq Q$.