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LEHRSTUHL FÜR INFORMATIK 2
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Introduction to Model Checking
Summer term 2010

– Series 1 –

Hand in on April 28 before the exercise class.

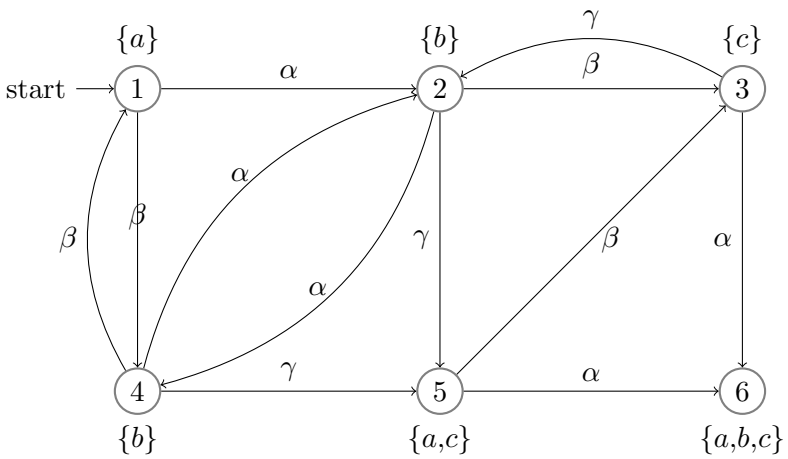
Exercise 1 (0.5 + 0.5 + 1 = 2 points)

We consider the basic definitions for transition systems. Let TS be the transition system depicted below.

a) Give the formal definition of TS.

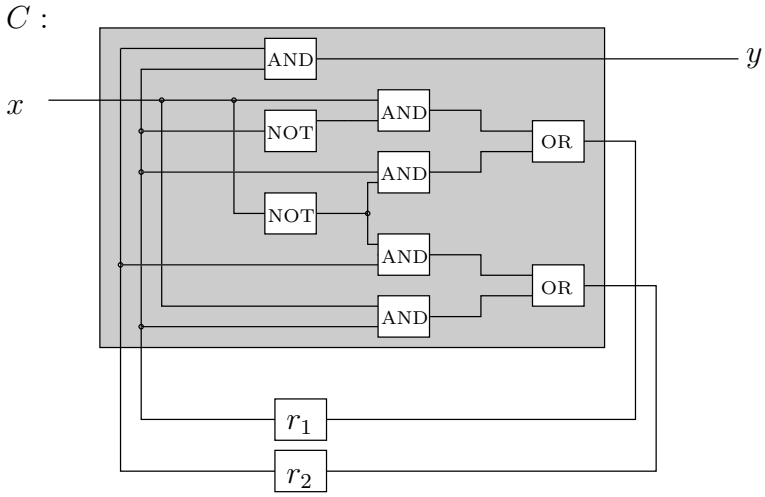
b) Specify a finite and an infinite execution of TS.

c) Decide whether TS is deterministic. Justify your answer!



Exercise 2 (3 points)

Consider the following sequential hardware circuit:



Give the transition system representation TS of the circuit C.

Exercise 3 **(2 + 3 = 5 points)**

Consider the following mutual exclusion algorithm that uses the shared variables y_1 and y_2 (which are initially both 0):

Process P_1:

while true **do**
  ... non-critical section ...
  $y_1 := y_2 + 1$
  wait until $(y_2 = 0) \vee (y_1 \leq y_2)$
  ... critical section ...
  $y_1 := 0$
  ... non-critical section ...
od

Process P_2:

while true **do**
  ... non-critical section ...
  $y_2 := y_1 + 1$
  wait until $(y_1 = 0) \vee (y_2 < y_1)$
  ... critical section ...
  $y_2 := 0$
  ... non-critical section ...
od

Questions:

a) Give the program graph representation of both processes.
(A pictorial representation suffices)

b) Give the reachable part of the transition system of $P_1|||P_2$ where $y_1 \leq 2$ and $y_2 \leq 2$.