

**Advanced Model Checking**  
**Summer term 2012**

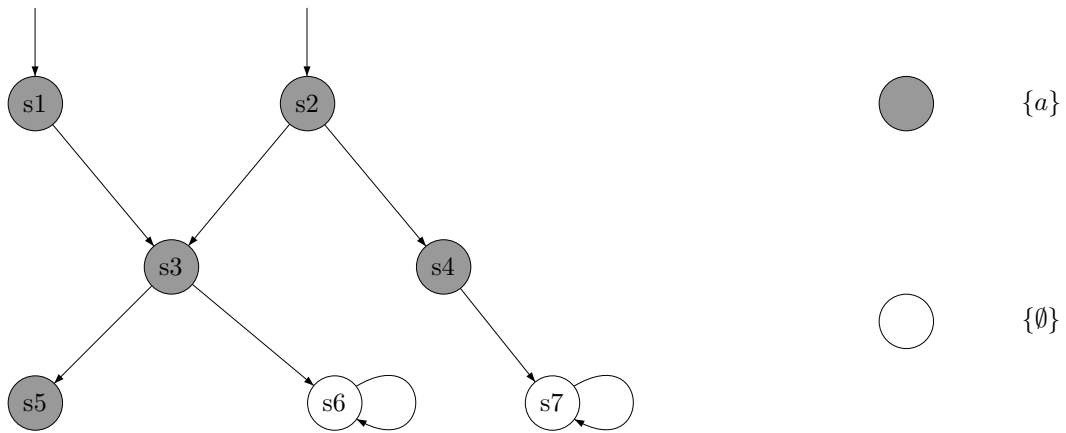
**– Assignment 5 –**

Hand in on May 23'th before the exercise class.

**Exercise 1**

(2 + 1 points)

Consider the transition system TS shown in the figure below:

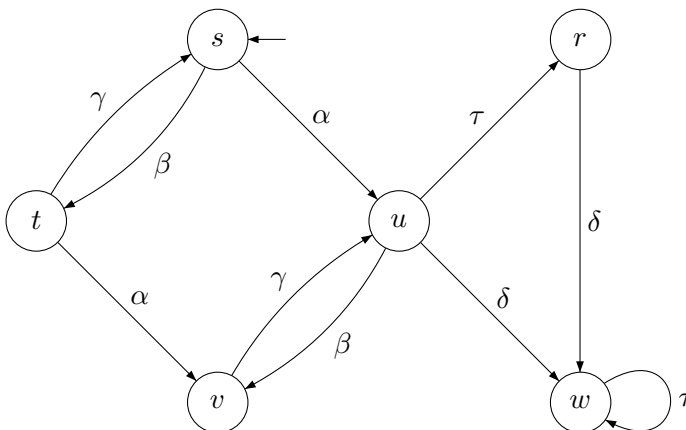


Compute the simulation order  $\preceq_{TS}$  by using the HHK-algorithm (Algorithm 36, page 526 in the book). Sketch the first four outerest iteration steps.

**Exercise 2**

(3 points)

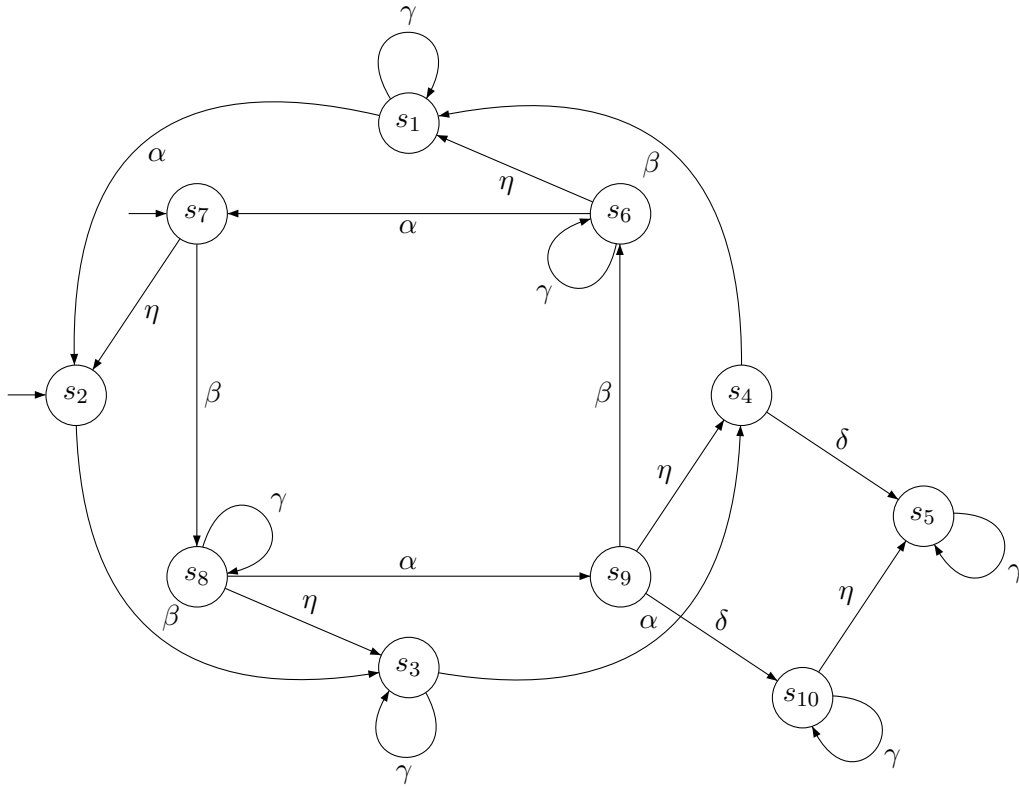
Given a transition system  $TS$  in the following figure with action set  $Act = \{\alpha, \beta, \gamma, \delta, \tau\}$ . Determine the pairs of independent actions.



### Exercise 3

(4 points)

Consider the transition system below:



The states labeling is as follows:

- $L(s_{10}) = \emptyset$
- $L(s_6) = L(s_7) = \{a\}$
- $L(s_3) = L(s_4) = L(s_5) = L(s_8) = L(s_9) = \{b\}$
- $L(s_1) = L(s_2) = \{a, b\}$

Prove or disprove that each of the following *ample sets* satisfy requirements *A1* through *A3* on the *ample sets*, also check whether the requirement *A4* holds:

- $ample(s_6) = \{\gamma, \alpha\}$
- $ample(s_7) = \{\beta\}$
- $ample(s_8) = \{\alpha\}$
- $ample(s_9) = \{\alpha, \beta, \delta\}$
- $ample(s_{10}) = \{\gamma, \eta\}$

In case some of the conditions *A1* through *A4* do not hold, modify the *ample sets* in an appropriate way to fix it. Clarify your changes.