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LEHRSTUHL FÜR INFORMATIK 2
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http://www-i2.informatik.rwth-aachen.de/

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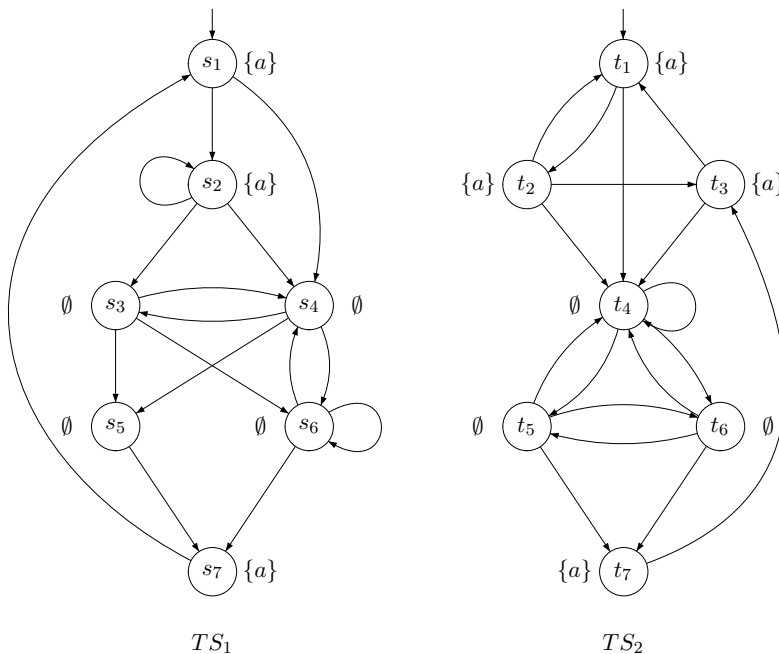**Advanced Model Checking**
Summer term 2009

– Series 2 –

Hand in on May 4'th before the exercise class.

Exercise 1 $(1+1$ **points)**

(a) Given transition systems TS_1 and TS_2, determine whether $Traces(TS_1) = Traces(TS_2)$.
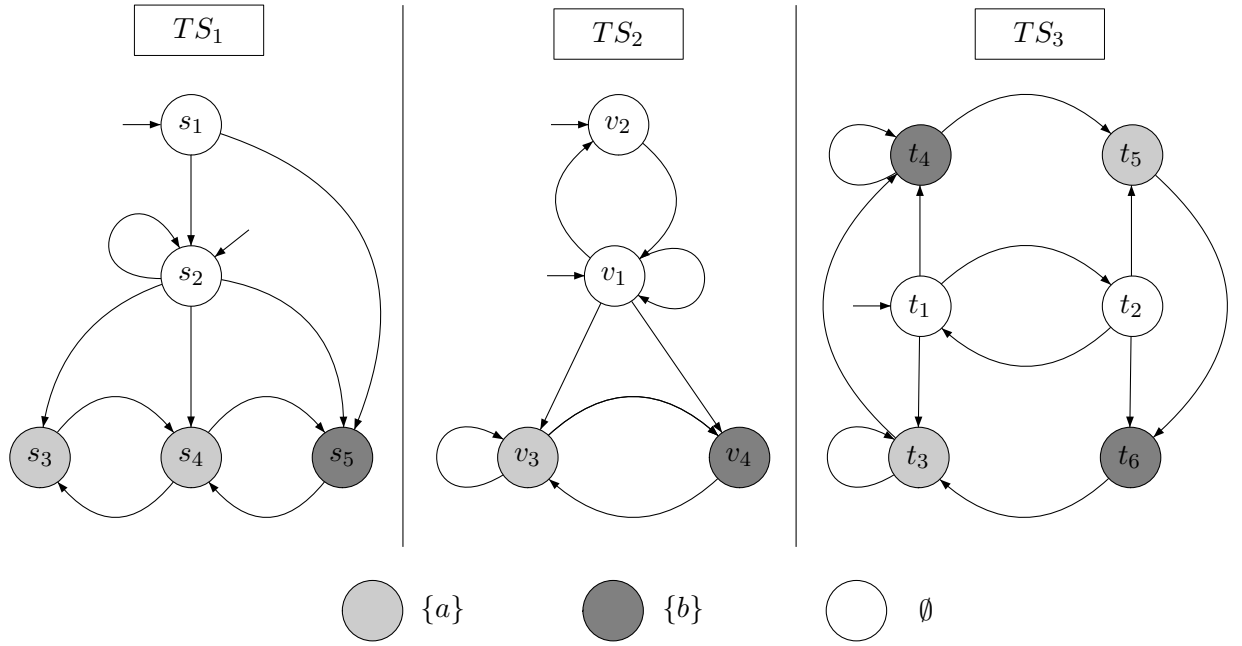

TS_1 TS_2

(b) Provide two transition systems TS_1' and TS_2' such that $Traces_{fin}(TS_1') = Traces_{fin}(TS_2')$, but $Traces(TS_1') \neq Traces(TS_2')$.

Exercise 2 $(1+1$ **points)**

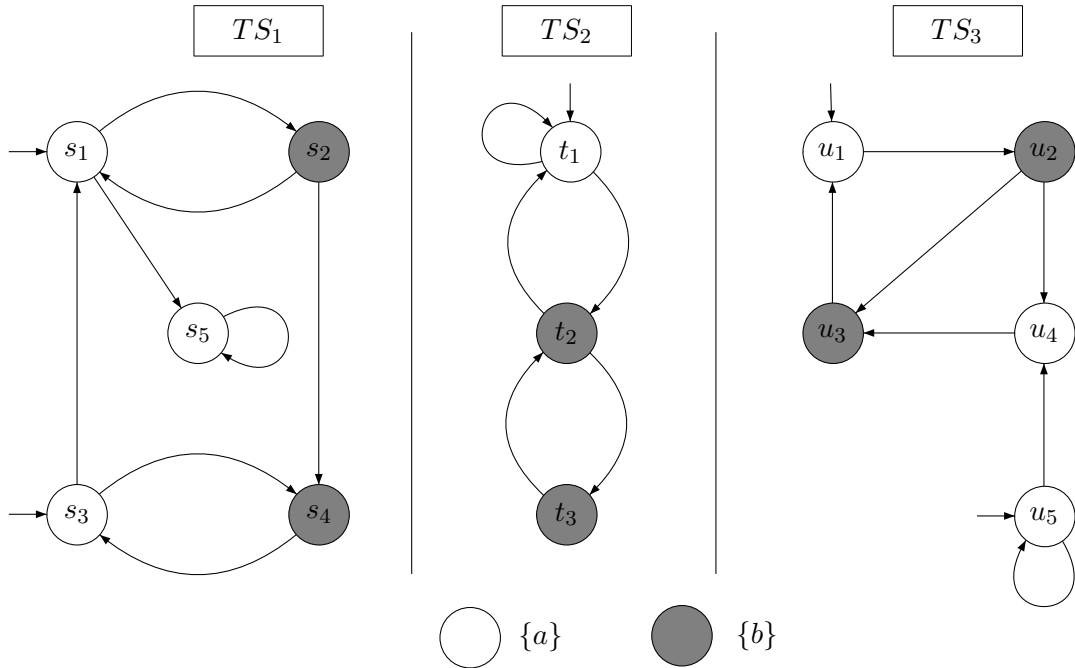Consider the transition systems TS_1 , TS_2, TS_3 over $AP = \{a, b\}$ shown in the following figure:

Questions:

(a) for each $i, j \in \{1 \ldots 3\} \times \{1 \ldots 3\}$, $i \neq j$, determine whether $TS_i \preceq TS_j$

(b) for each case $TS_i \not\preceq TS_j$, give a $\forall\text{CTL}_{\setminus \cup}$ - formula that distinguishes TS_i and TS_j.

Exercise 3   (2 points)

Consider three transitions systems given on the next Figure:

For each $i, j \in \{1 \ldots 3\} \times \{1 \ldots 3\}$, $i \neq j$, determine whether $TS_i \cong TS_j$, $TS_i \trianglelefteq TS_j$ or $TS_i \ntrianglelefteq TS_j$. Justify your answer.

Exercise 4 (4 points)

Let φ be an LTL formula such that $Word(\varphi)$ is stutter insensitive.
Show that φ is equivalent to some $\text{LTL}_{\backslash\bigcirc}$ formula ψ.