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# Modeling and Verification of Probabilistic Systems
# Summer term 2011

## – Series 12 –

Hand in on 13th July before the exercise class.

### Exercise 1 (3 points)

Given three IMCs $E_1$, $E_2$, $E_3$ in Fig. 1, where $a, \tau$ are actions and $\lambda, \mu$ are exponential rates.

- Do we have $s_1 \sim_m t_1$?
- Do we have $t_1 \sim_m u_1$?
- Do we have $t_1 \approx_m u_1$?

### Exercise 2 (3 points)

Consider the two Probabilistic automata $P_1$ and $P_2$ given in Fig. . Do we have:

- $s_1 \sim_p u_1$?
- $s_1 \sim_{cp} u_1$?

### Exercise 3 (2 points)

For any CSL path formula $\varphi$ and state $s$ of CTMC $C$, prove that the set $\{\pi \in Paths(s) \mid \pi \models \varphi\}$ is measurable.

### Exercise 4 (2 points)

Consider the CTMC given in Fig. 3. Give CSL formula that shows that $s_1 \not\sim_m s_2$.

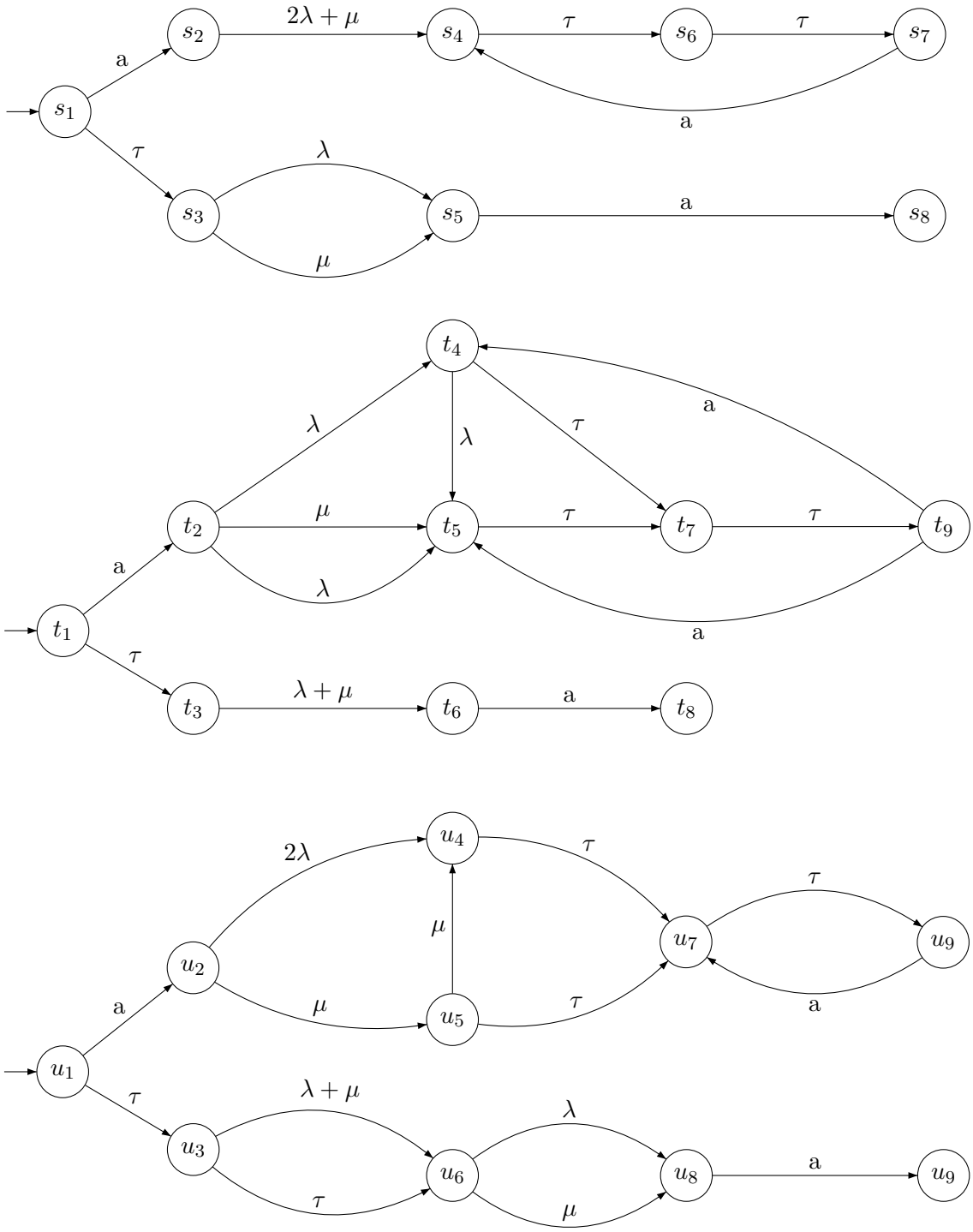


Abbildung 1: IMCs

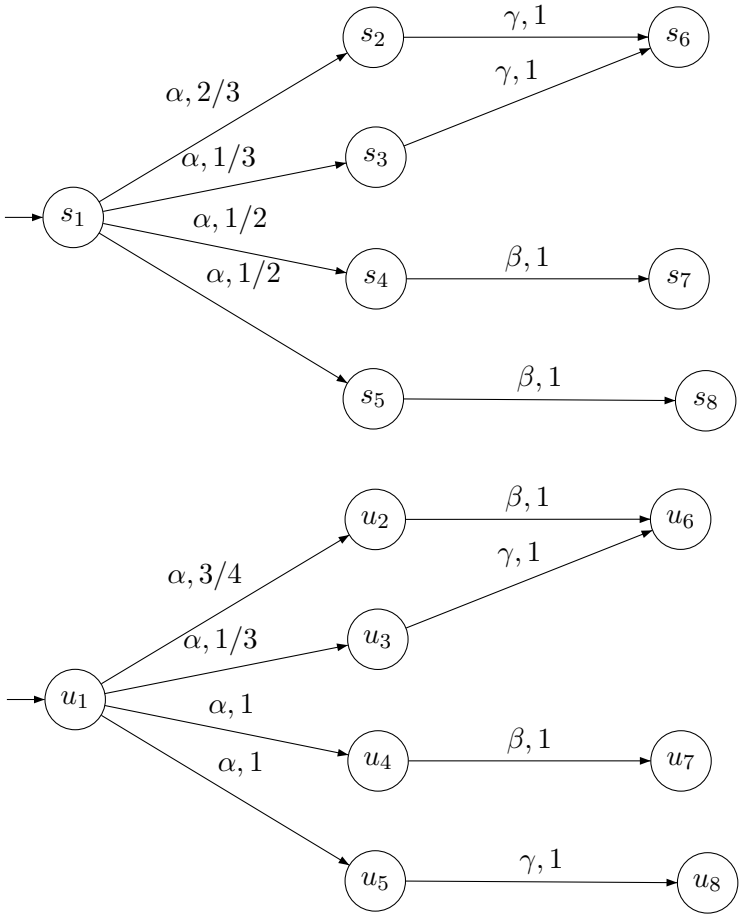


Abbildung 2: PAs

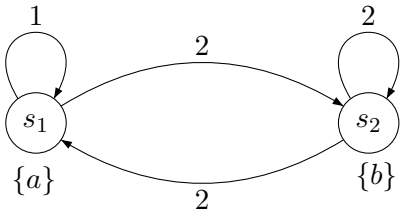


Abbildung 3: CTMCs