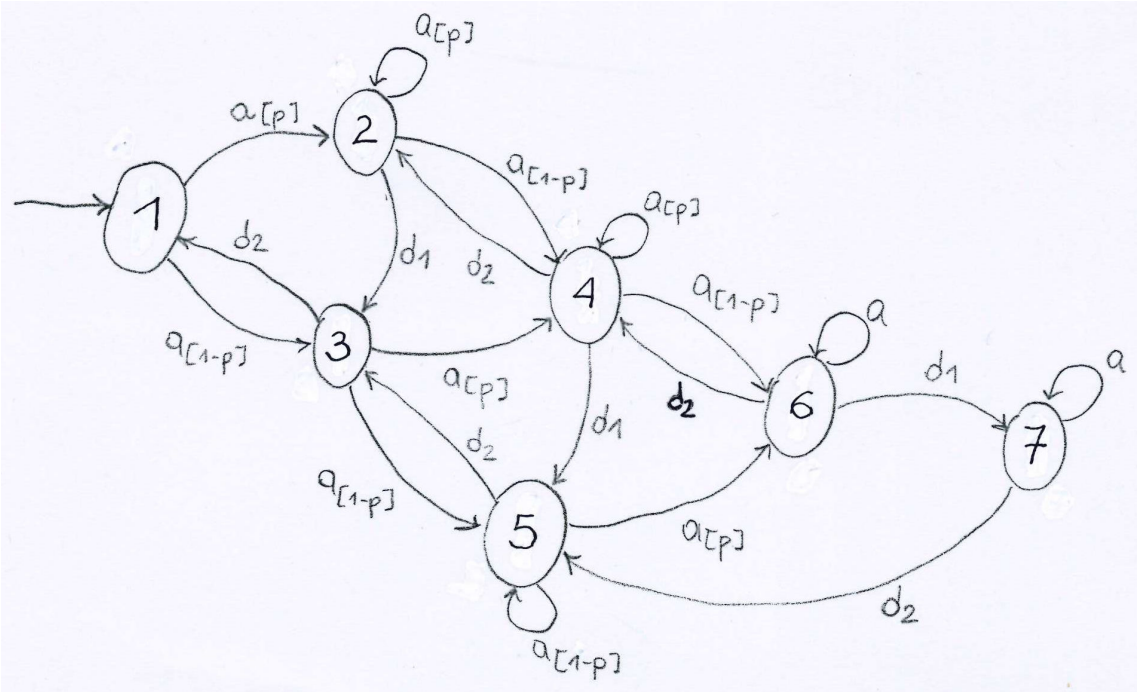
Test of Discrete Event Systems - 27.11.2017

Exercise 1

Consider the stochastic timed automaton represented in the figure,



where $\mathcal{E} = \{a, d_1, d_2\}$, $\mathcal{X} = \{1, 2, 3, 4, 5, 6, 7\}$, $p = 3/5$, and the initial state is $x_0 = 1$. Using Matlab, simulate the model and estimate the limit probabilities

- $\lim_{k\to\infty} \mathrm{P}(X_k = x)$
- $\lim_{k\to\infty} \mathrm{P}(E_k = e)$

for all states $x \in \mathcal{X}$ and events $e \in \mathcal{E}$, under the following different assumptions about the stochastic clock structure.

1. The lifetimes of events a, d_1 and d_2 follow uniform distributions over the intervals $[15, 25]$, $[12, 18]$, and $[16, 20]$ min, respectively.

2. Event a is generated by a Poisson process with average interevent time equal to 20 min, while d_1 and d_2 are as above.

3. Event a is generated by a Poisson process as above, while d_1 and d_2 have deterministic lifetimes, all equal to 15 and 18 min, respectively.