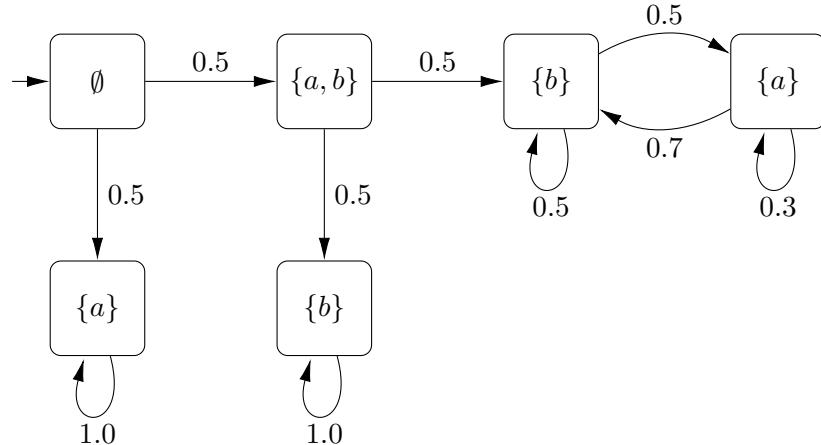


Quantitative Verification 10

Ex 1: PLTL Model Checking

Consider the following Markov Chain.



Check whether $\mathcal{P}[\mathbf{F} \mathbf{G} a \vee \mathbf{F} \mathbf{G} \neg a] = 1$ holds on the given Markov Chain, using the methods from the lecture.

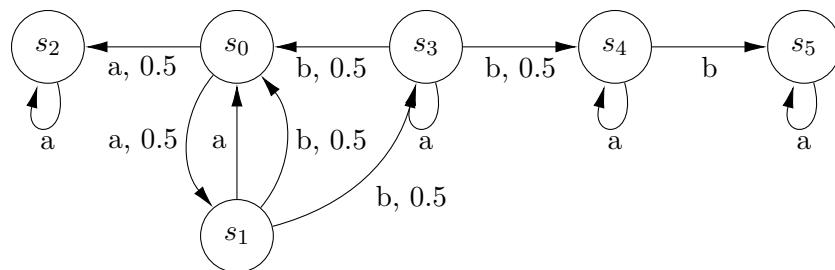
Ex 2: MDP Modelling

Model the following situation as an MDP.

A robot is placed in a 3x2m arena at the south-west corner (0, 0). Its goal is to reach a *repair station* at (3, 1), but the arena is not without its challenges. At (2, 0) and (3, 2) are two rotor blades spinning at 20000 RPM which is certain death for the robot. A previous close encounter with another such hazard has left the robot with certain eccentricities. Firstly, it cannot move south or west. Secondly, if it tries to move north, it succeeds only 90% of the time. Finally, 10% of attempts to move east is accompanied with a major southwards deviation, which makes the robot end up 1m south of its intended target.

Ex 3: MDP Reachability

First, consider the following MDP.



What is the maximal probability of reaching s_2 ? What is the optimal strategy for maximizing the probability of reaching s_5 ? How many optimal strategies are there?

How would you try to solve this type of questions in general, e.g., for the MDP in the previous exercise?