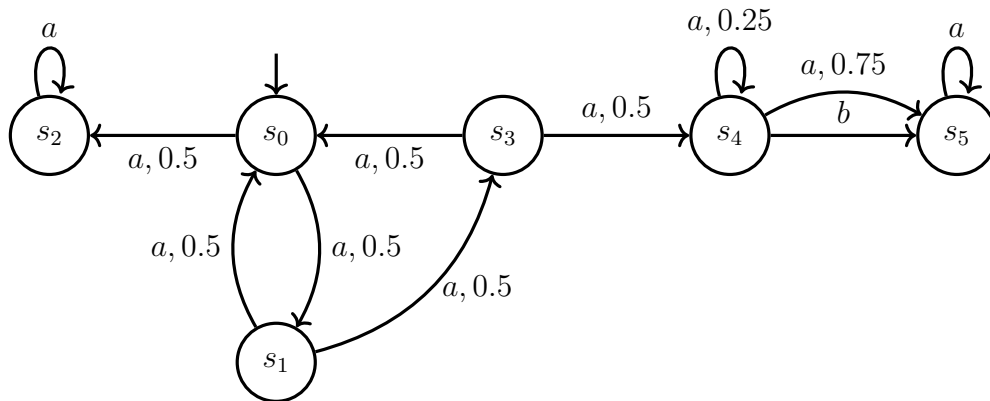


## Quantitative Verification – Exercise sheet 10

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### Exercise 10.1

Consider the following MDP.



Write down the reachability LP for  $B = \{s_5\}$ .

### Exercise 10.2

From the slides, we know that memoryless schedulers are sufficient for (unbounded) reachability, but not for its bounded counterpart. Try to come up with an MDP where some bounded reachability query can only be maximized by a scheduler with memory. Argue why finite memory is sufficient. How would you solve a bounded reachability query in general?

### Exercise 10.3

We defined the “stopping criterion” of value iteration as  $\max_s |x_{n+1}(s) - x_n(s)| < \epsilon$  for some small  $\epsilon$ . This tends to work in practice, but is not sound in general, i.e. there are some MDPs where this property is fulfilled, but the resulting strategy is not optimal. Can you think of such an MDP?