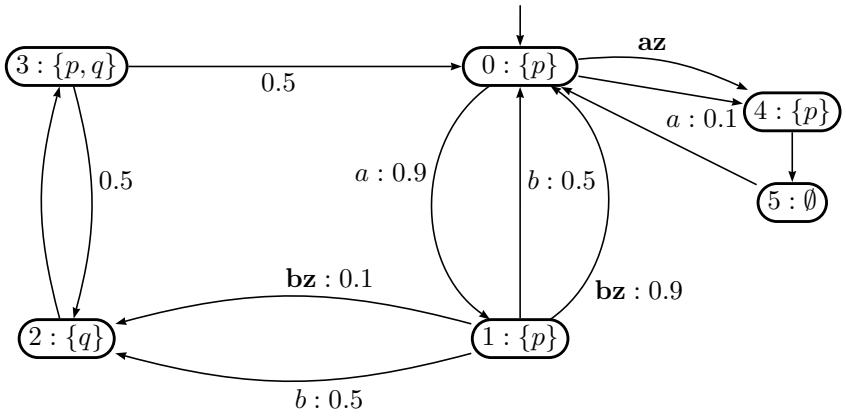
MDP

Chance

1. Imagine an MDP M, modelling some non-deterministic as well as probabilistic system. Let s be a state of M. What does $s \models \mathbf{P}_{\geq c}[\phi]$ and $s \models \mathbf{P}_{\leq c}[\phi]$ mean in the context of MDP?

2. Consider the following MDP M modelling some non-deterministic as well as probabilistic system. There is non-determinsim in states 0 and 1. In states 0, two actions are possible a and **az**. The choice between them is non-deterministic. The action a leads to either state 1 or 4, but with different probability. The action **az** is non-probabilistic: it always lead to state 4.

   In state 1, we also have two actions that are are possible: b and **bz**. The choice between them is non-deterministic. Both actions lead to either state 0 or state 2, but with different probabilities.



   Describe the procedure to check $0 \models \mathbf{P}_{\geq 0.01}\ [p\ \mathbf{U}\ q]$ on M.

   Is $1 \models \mathbf{P}_{\geq 0.01}\ [p\ \mathbf{U}\ q]$ also valid?

3. Consider again the model in No. 2. Check if this is valid: $0 \models \mathbf{P}_{\leq 0.82}\ [p\ \mathbf{U}\ q]$. Show how the model check works for this case.