

## Algorithms and Uncertainty

Winter Term 2023/24

Tutorial Session - Week 5

### Exercise 1:

We consider the following stochastic decision problem: There are  $n$  boxes; box  $i$  contains a prize of 1 Euro with probability  $q_i$  and is empty otherwise. The game ends when we have found a non-empty box. That is, the final prize is either 0 Euros or 1 Euro. At each point in time, we can also decide to stop playing. We can open as many boxes as we like but opening box  $i$  costs  $c_i$  Euros.

- (a) Model this problem as a Markov decision process. In particular, give the state and action sets as well as transition probabilities and rewards.
- (b) Find an optimal policy for the case  $n = 1$ .

Bonus: Find an optimal policy for the case  $n = 2$ .