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November 9, 2026
Due: November 16, 2026 at 10:00 p.m.

Algorithms and Uncertainty

Winter Term 2026/27

Exercise Set 5

If you would like to submit your solutions for this problem set, please send them via email to jluz@uni-bonn.de by Monday evening. Submitting solutions in groups is also possible.

If you would like to present one of your solutions in class, please use the following link to book a presentation slot by Monday evening:
https://terminplaner.dfn.de/public/bookings/e82ce056-fe29-43bc-9e53-0d5901bf7aaf
A short meeting to discuss your solution is mandatory before presenting it in class. To book a time slot for this meeting, please use the following link by Monday evening as well:
https://terminplaner.dfn.de/public/bookings/26d8a2a7-9d0d-44e9-beae-9eb64102e85d

Exercise 1: (2 Points)
Consider the cost-minimization variant of the optimal stopping problem in which we know the prior distributions. In step i, we can stop the sequence at cost c_i. We have to stop the sequence at some point and want to minimize the cost for doing so.
Show that there is **no** $\alpha < \infty$ such that for all distributions the optimal policy has cost at most $\alpha \mathbf{E}[\min_i c_i]$.

Exercise 2: (5 Points)
We consider the following stochastic decision problem: There are n boxes; box i contains a prize of 1 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 or 1. 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. The goal is to maximize the final prize minus the sum of opening costs. Find an optimal policy.

Hint: It can be useful to consider the cases $n = 1$ and $n = 2$ first.

Please sign up here for the midterm so we have an estimate on how many people will take the test!
https://terminplaner.dfn.de/public/bookings/9093a944-7f15-4a37-879f-977240dcc0be