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December 1, 2025
Due: December 8, 2025 at 10:00 p.m.

Algorithms and Uncertainty

Winter Term 2025/26

Exercise Set 8

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://terminplaner6.dfn.de/b/2bf089af26d325afc757343221050056-1505392
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://terminplaner6.dfn.de/b/585a09b0b4313bc1780fc5d0cfa2b9c7-1505397

Exercise 1: (3+4 Points)
We extend the problem of opening boxes from Lecture 13. We are still allowed to open k boxes, but now, we may keep up to ℓ prizes instead of only one.

(a) Derive a linear program such that the expected reward of any adaptive policy is upper-bounded by the value of the optimal LP solution. Give a proof.

(b) Show that the adaptivity gap is still at most 8.

Exercise 2: (4 Points)
Show that Stochastic Two-Stage Set Cover can be reduced to the deterministic problem. To this end, define a different universe of elements U', family of subsets $\mathcal{S}'$, and costs $(c'_{S'})_{S' \in \mathcal{S}'}$ appropriately. Any solution of this Set Cover instance then corresponds to a policy of the same expected cost.