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Algorithms and Uncertainty

Winter Term 2023/24

Tutorial Session - Week 7

Exercise 1:
Consider the following distribution for the prize of box i: the prize v_i is equal to w_i with probability q_i and is 0 else. Compute the fair cap.

Exercise 2:
Consider the minimization variant of Pandora's Box. We have n boxes. Each of the boxes contains an item of certain weight. We may open as many boxes as we like, however opening box i costs a certain amount. We have to take home one item and we need to open the box before taking the item. We may adapt our choices depending on what we find in the boxes that we open.
More formally, box i contains an item of weight w_i. We don't know w_i but only its distribution until we open the box. Opening box i costs c_i. The final weight is given as

$$\min_{i:\text{box } i \text{ opened}} w_i + \sum_{i:\text{box } i \text{ opened}} c_i$$

a) For box i with weight w_i and cost c_i define the fair cap $\sigma_i^{\min}$, the bonus $b_i^{\min}$ and the capped value $\kappa_i^{\min}$.

b) What is the optimal policy for this variant?