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Algorithms and Uncertainty
Winter Term 2025/26
Tutorial Session - Week 10

Exercise 1:
Recall the regret definition from the lecture: $\text{Regret}^{(T)} = L_{\text{Alg}}^{(T)} - \min_i \sum_{t=1}^{T} \ell_i^{(t)}$.

(a) Use Yao's principle to show that for every (randomized) algorithm there is a sequence $\ell^{(1)}, \ldots, \ell^{(T)}$ such that $L_{\text{Alg}}^{(T)} \geq \left(1 - \frac{1}{n}\right) T$ but $\sum_{t=1}^{T} \min_i \ell_i^{(t)} = 0$.

(b) Discuss the importance of the order of sum and minimum in the regret definition using your results from (a).