

Algorithms and Uncertainty

Winter Term 2025/26

Tutorial Session - Week 14

Exercise 1:

We consider Online Quadratic Optimization. That is, in each round, the function f_t has the form $f_t(\mathbf{x}) = \frac{1}{2} \|\mathbf{x} - \mathbf{y}_t\|_2^2$ for some vector \mathbf{y}_t . Show that the regret of Follow-the-Leader is bounded by $4 \cdot (\max_t \|\mathbf{y}_t\|)^2 \cdot (\log T + 1)$.

Hint: Use Lemma 22.3 to bound the regret. In addition, note that for the k -th harmonic number H_k , we have $H_k \leq \log k + 1$.