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Algorithmic Game Theory
Winter Term 2021/22
Tutorial Session - Week 4

Exercise 1:
In Lecture 7, we did assume that $\ell_i^{(t)} \in [0, 1]$ for all i and t. We would now like to consider the setting, in which $\ell_i^{(t)} \in [-\rho, \rho]$ for all i and t and some fixed $\rho > 0$. Can you state a no-regret algorithm for this case? Also give a bound for the regret. You should reuse algorithms and results from the lectures.

Exercise 2:
In the lecture we presented the Multiplicative-Weights Algorithm (MW) as an example for a no-external-regret algorithm with an a priori known and fixed time horizon T. Can you state a no-external-regret algorithm which does not need the parameter T?

Hint: You may want to use the algorithm of the lecture as a subroutine. Initially, assume $T = 1$ and make use of the subroutine. Once a subroutine ends, double the parameter T and restart the subroutine.