

Algorithmic Game Theory

Summer Term 2025

Tutorial Session - Week 4

*You are supposed to work on these tasks in class together with your fellow students.
Please find groups of 2 or 3 students!*

Exercise 1:

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.

Exercise 2:

State for each $M \geq 1$ a network congestion game with two players such that the Price of Anarchy of pure Nash equilibria is at least M .