

Algorithmic Game Theory

Winter Term 2021/22

Tutorial Session - Week 3

Exercise 1:

Consider the local search problem *Positive Not-All-Equal kSat* (Pos-NAE- k SAT) which is defined the following way:

Instances: Propositional logic formula with n binary variables x_1, \dots, x_n that is described by m clauses c_1, \dots, c_m . Each clause c_i has a weight w_i and consists of exactly k literals, which are all positive (i.e., the formula does not contain any negated variable \bar{x}_i).

Feasible solutions: Any variable assignment $s \in \{0, 1\}^n$

Objective function: Sum of weights of clauses c_i in which not all literals are mapped to the same value.

Neighbourhood: Assignments s and s' are *neighbouring* if they differ in the assignment of a single variable.

Show that Pos-NAE- k SAT is in PLS.

Exercise 2:

Let p, p' be coarse correlated equilibria of a cost-minimization game Γ . Prove that any convex combination of the distributions p and p' yields also a coarse correlated equilibrium of Γ (i.e., any distribution $q := \lambda p + (1 - \lambda)p'$ for some $\lambda \in [0, 1]$).