Thomas Kesselheim
Rebecca Lehming

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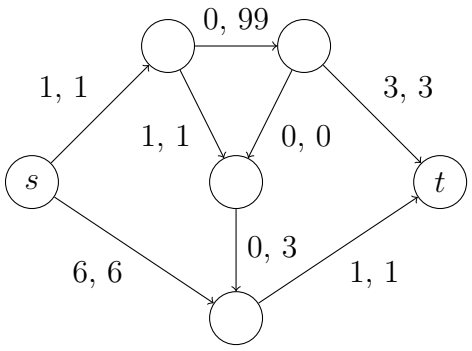
Algorithmic Game Theory

Summer Term 2025

Tutorial Session - Week 3

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

Exercise 1:
Consider the following symmetric network congestion game with two players. Rewrite the game as a bimatrix game. Why is it sufficient to state only the upper or lower triangular matrix?



Exercise 2:
Consider the local search problem *Positive Not-All-Equal kSat* (Pos-NAE-kSAT) 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 $\overline{x}_i$).

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-kSAT is in PLS.