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Sheet 06

Combinatorial Optimization

Exercise 1 (Another 1/2-Approximation for Maximum Satisfiability)

Show that the following algorithm is a 1/2-approximation for Maximum Satisfiability. Let τ be an arbitrary truth assignment and τ' be its complement, i.e., a variable is set to 0 in τ if and only if it is set to 1 in τ'. Compute the weight of clauses satisfied by τ and τ' and output the better assignment.

Exercise 2 (Preemptive Makespan Scheduling)

Consider the *preemptive* version of Makespan Scheduling on identical machines. That is, we allow that the computation of a job to be partitioned into parts that can each run on any machine, but no two parts of the same job can run at the same time.
Give an algorithm that solves this problem optimally in polynomial time and determine its running time.

Exercise 3 (List Scheduling Revisited)

Show that the List Scheduling algorithm from the lecture for Makespan Scheduling on identical machines is actually a $(2 - 1/m)$-approximation algorithm, where m is the number of machines.

Exercise 4 (Lower Bound for Sorted List Scheduling)

Give a class of examples for the Sorted List Scheduling algorithm from the lecture for Makespan Scheduling on identical machines that shows a lower bound of 4/3.