

Problem set 10
Computational Complexity.

1. Consider the following problem denoted $DNF - SAT$:
Input: A DNF formula Φ Question: is Φ satisfiable?
Does $DNF - SAT \in P$?
(Recall that a DNF formula is composed of clauses, each containing literals; we have an \wedge between literals and an \vee between clauses. E.g, $\Phi(x \wedge \bar{y} \wedge z) \vee (\bar{y} \wedge \bar{z}) \vee (x \wedge z \wedge w \wedge t \wedge s)$)
2. Solve question 3 from exam cc04b-a (regarding the class DP).
3. Prove that $HALT \in NP - hard$ i.e, $SAT \leq_L HALT$.
HALT:
Input: $x, y \in \{0, 1\}^n$
Question: Does the machine M_x (whose description is x) halts on input y ?
(Hint: The reduction you suggest have to be log-space computable, and hence polynomial in time. The machine you output does not have to be time bounded).
4. Complete the proof we gave in class. Show that $Reach(C_1, C_2, 2^t)$ is true iff there is a path of length at most 2^t from configuration C_1 to C_2 in the configuration graph of I .