

Exercise sheet 3

Exercise 3.1. NAE-3SAT (“Not-All-Equal 3-SAT”) is the problem of deciding for a given 3-CNF formula whether there is a truth assignment to the variables so that in every clause, there is at least one true literal and at least one false literal. That is, Not All literals take Equal value.

Use the following transformation to show that NAE-3SAT is NP-hard: Given a clause $C_j : \ell_0 \vee \ell_1 \vee \ell_2$, where ℓ_i are literals, replace it by the two clauses $\ell_0 \vee \ell_1 \vee w_j$ and $\neg w_j \vee \ell_2 \vee p$ where w_j is a different variable for every clause C_j but p is the same variable for every clause.