Exercise 1. Show that NP ⊆ EXP.

Exercise 2. Consider the following problem REVERSE-3SAT:

**Instance:** A propositional formula ϕ in 3CNF— that is, a formula of the form ϕ = c₁ ∧ · · · ∧ cₘ, where each cᵢ is of the form cᵢ = lᵢ,₁ ∨ lᵢ,₂ ∨ lᵢ,₃, where lᵢ,₁, lᵢ,₂, lᵢ,₃ are propositional literals.

**Question:** Is there a truth assignment α to the variables occurring in ϕ that sets at least one literal in each clause cᵢ to false?

Prove that REVERSE-3SAT is NP-complete—that is, prove that is in NP and that it is NP-hard. To show NP-hardness, you may give a reduction from any known NP-complete problem.

- **Hint:** reduce from 3SAT.

Exercise 3. Give a polynomial-time Turing machine M that has access to an oracle for REVERSE-3SAT and that solves 3SAT.