

Exercise 2

Optimization Problem

Optimization problem is the problem of finding the best solution from all feasible solutions. One possible instance is the following. Given a constraint F and a target formula f , we want to find a solution s of F such that $f(s) \leq f(s')$, where $s' \neq s$ is any other solution of F .

Questions

Now we assume that $F = (2x + y < 6) \vee (3x < 7 \wedge 2y < 1)$ and $f = -2x - y$.

1. Write a quantifier-free FOL in $T_{\mathbb{Q}}$ over *only* x and y such that their solutions are also the solutions of optimization problem when the variable domains are real numbers.
2. Do the above in $\widehat{T}_{\mathbb{Z}}$ and over integer domains.

Hint: you can begin with a formula with alternation of quantifiers and do quantifier elimination.