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Tutorials for Decision Procedures
Exercise sheet 7

Exercise 1: Deciding $T_{\mathbb{Q}}$

Apply the Dutertre-de-Moura algorithm to decide the $T_{\mathbb{Q}}$-satisfiability of the following $\Sigma_{\mathbb{Q}}$-formulae: Give a satisfying $T_{\mathbb{Q}}$-interpretation if it exists.

(a) $x + 2y \geq 1 \ \wedge \ 2x + y \geq 1 \ \wedge \ x + y \leq \frac{1}{2}$

(b) $x + 2y \geq 1 \ \wedge \ 2x + y \geq 1 \ \wedge \ x + y \leq 1$

(c) $x + 2y > 1 \ \wedge \ 2x + y > 1 \ \wedge \ x + y < 1$

(d) $x + 2y \geq 1 \ \wedge \ 2x + y \geq 1 \ \wedge \ x + y < \frac{2}{3}$

Exercise 2: Implementing the decision procedure for $T_{\mathbb{Q}}$ (8points)

Implement the Dutetre de Moura Algorithm from the lecture for input in the SMTLIB 2 format you already know.

Assume a conjunctive fragment where only atoms of the form `(<= (+ t_1 ... t_n) c_i)` are asserted.

```
t_i ::= (* c_i x_i) | (- x_i) | x_i
c_i ::= (- n) | n
```

with `n` being a natural number and `x_i` being variable names.

On the lecture's website there is code which generates a tableau and the other necessary values from such input. There also is a readme-file with some technical instructions at the same place.