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## Tutorials for Decision Procedures Exercise sheet 6

### 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 Dutertre 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  $(\leq (+ t_1 \dots t_n) c_i)$  are asserted.

$t_i ::= (* c_i x_i) \mid (- x_i) \mid x_i$

$c_i ::= (- n) \mid n$

with  $n$  being a number and  $x_i$  being variable names.

On the lecture's website there is code which builds a tableau and the other necessary values from such input. You can copy both files into a directory together with the `smtinterp.jar` from the website and compile it with

```
javac -cp smtinterp.jar Main.java LraSolver.java
```

Execute with

```
java -cp smtinterp.jar:. Main (under Windows use “;” instead of “.”)
```