

Homework

- (a) Extend `Satml` by a function which pushes negations towards atoms.
(b) Extend `Satml` by a function which generates formulas of given size.
(c) Experiment with formulas of different size (e.g. 100, 1000, 10000) how CNF generation time / SAT solving time is affected by preprocessing the formula with (a).

- Consider the formula with uninterpreted functions:

$$F(H(x_2)) = G(H(x_1), x_2) \wedge F(x_1) = G(x_1, F(x_2)) \wedge H(F(x_1)) \neq G(F(x_1), F(x_2))$$

- Transform the formula into an equivalent equality logic formula using Ackermann's reduction.
- Transform the formula into an equivalent equality logic formula using Bryant's reduction.

- Use the congruence closure algorithm to determine the satisfiability of the following formulas:

(a) $F(F(x)) = F(x) \wedge F(F(F(F(F(F(x)))))) = x \wedge F(x) \neq x$

(b) $F(G(x)) = G(F(x)) \wedge F(G(F(y))) = G(x) \wedge F(y) = x \wedge G(F(x)) = x$

(c) $G(F(G(F(x)))) = F(F(F(x))) \wedge F(G(F(x))) = G(F(x)) \wedge F(G(x)) = G(F(x)) \wedge G(G(x)) = F(F(x)) \wedge G(x) \neq G(F(x))$