

SAT and SMT Solving | SS 2019 | LVA 703048

Exercises 3 | March 29, 2019

[3] 1 Apply the Branch & Bound algorithm to the formula

$$\varphi = \neg y \wedge (x \vee y) \wedge (\neg x \vee z) \wedge (\neg x \vee y) \wedge (\neg x \vee \neg y) \wedge (x \vee z) \wedge (\neg x \vee \neg y \vee z) \wedge (y \vee \neg z) \wedge z$$

to determine minUNSAT(φ).

2 Implement a maxSAT solver based on binary search, e.g. in Python while using the `z3` library for satisfiability checks.

[3] (a) Write a function `maxSAT` which takes a list of list of `z3` variables representing a CNF formula φ, and returns maxSAT(φ). Test it on the examples of Exercise 1 and the slides of Week 3.

[1] (b) Also return a valuation which maximizes the number of satisfied clauses.

[3] 3 The Binary Puzzle (also known as Sudoku for Computer Scientists) is a puzzle where the player need to put a 0 or 1 bit in a partially filled square such that

(a) Every row and column has the same number of 1 bits.

(b) No three consecutive 1 bits are allowed in columns or rows.

	0		
			1
		0	
	1		

Write a program to solve the given Binary Puzzle using a SAT encoding.

[3] ⋆ 4 Prove by induction on the number of variables in a formula φ that the Branch and Bound algorithm run on a formula φ returns minUNSAT(φ).