

[3] 1 Implement the algorithm by Fu and Malik for partial maxSAT, using the support for unsatisfiable cores in `python/z3`.

[3] 2 Check satisfiability of the following formula using `DPLL(T)`.

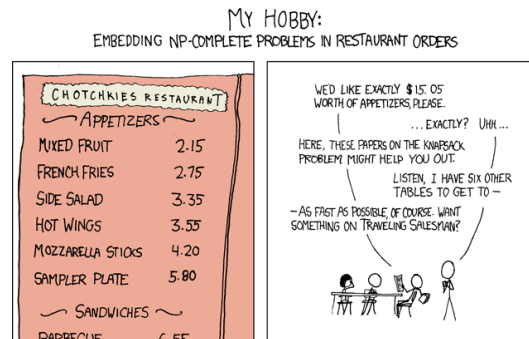
$$f(a) \approx g(f(b), a) \wedge f(f(b)) \approx g(a, a) \wedge (f(b) \approx b \vee f(b) \approx a) \wedge g(b, a) \approx a \wedge \\ (f(a) \not\approx a \vee f(g(b, a)) \not\approx g(a, a))$$

[2] 3 Solve the 3-coloring problem for the state map of Austria using uninterpreted functions by encoding it in `SMT-LIB 2` (or `python/z3`). To that end, define sorts `state` and `color` as well as a constant for every state. Then assert that neighboring states have different colors.

Hint: use an additional constraint of the form

`(forall ((C1 color) (C2 color) (C3 color) (C4 color)) (not (distinct C1 C2 C3 C4)))`
to demand that there exist only three colors.

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[2] (a) Help the waiter: use an SMT encoding with linear arithmetic to determine a possible combinations of starters. Are there more solutions?

[1] ★(b) Field survey: Pose an NP complete problem to a waiter, document the reaction on video and submit it.

[3] ★ 5 Imagine a village of monkeys where each monkey owns at least two bananas. As the monkeys are well-organised, each tree contains exactly three monkeys. Monkeys are also very friendly, so every monkey has a partner. Encode the problem to `SMT-LIB` format and find a model. How many monkeys, bananas, and trees are there according to the model? Is this the minimal possible number?

Hint: The file `monkeys.smt2` shows how monkeys can own bananas.