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Tutorials for Decision Procedures Exercise sheet 14

Exercise 1: π VC – proving total correctness

Use π VC to prove total correctness of the example program `InsertionSort` from the π VC-website (<https://cs.stanford.edu/people/jasonaue/pivc/samples/>).

Choose *one* of the following settings to solve this exercise:

- Replace the postcondition by `true` and uncheck the flag “Generate Runtime Assertions” in the “Settings” menu. Add the loop invariants and the ranking function to show correctness of the loop invariants and termination.
- Take your solution from exercise 2 on sheet 13 and extend it with the annotations needed to prove termination. Make sure that partial correctness is still given, and if necessary, adjust the loop invariants.

Exercise 2: Interpolation for T_E

Compute the Craig interpolant for each of the following T_E -formula pairs:

(a)

$$F : a = y \wedge x = f(a) \wedge z = w \wedge a \neq c$$
$$G : c = b \wedge b = x \wedge f(y) \neq z \wedge w = b$$

(b)

$$F : g(f(x)) = a \wedge f(g(x)) = a \wedge a \neq x$$
$$G : f(g(f(b))) = x \wedge f(b) = x$$

Exercise 3: Interpolation for $T_{\mathbb{Q}}$

Compute the Craig interpolant for the following $T_{\mathbb{Q}}$ -formula pair:

$$F : x \geq a \wedge a \geq -2y + 1 \wedge 2a + y \geq 1$$
$$G : x + y \leq \frac{1}{2}$$