



Tutorial for Program Verification Exercise Sheet 16

In this exercise sheet we work with strongest postconditions of a set of states under a given statement.

Submit your solution by uploading it as PDF in ILIAS.

Exercise 1: Strongest Postcondition

3 Points

Below, you find six sets of states that are each given as a strongest postcondition. Write down each set without using the strongest postcondition operator (The strongest postcondition operator is defined for formulas and will be presented on Wednesday). You may use any formalism that you have seen in the lecture. Recall that $\{\varphi\}$ denotes the set of states that satisfy the formula φ . In the formulas below, i, k, x are integer variables and a is an array whose indices and values are integers.

- (a) $\text{sp}(\{\text{select}(a, k) = 23 \wedge \text{select}(a, i) = 42\}, \text{assume } i == k;)$
- (b) $\text{sp}(\{0 \leq k \wedge k \leq i\}, \text{havoc } k;)$
- (c) $\text{sp}(\{\text{select}(a, 23) = 42\}, \text{a}[k] := 1337;)$
- (d) $\text{sp}(\{x \cdot x > 5\}, \text{x} := \text{k} - \text{i};)$
- (e) $\text{sp}(\{x \% 2 = 0\}, \text{x} := \text{x} + 1;)$
- (f) $\text{sp}(\{\text{select}(a, i + 1) = 23\}, \text{i} := 2 * \text{k} + \text{i};)$