



Tutorial for Program Verification Exercise Sheet 8

In this exercise sheet, we work with the semantics of our programming language Boostan.

Submit your solution by uploading it as PDF in ILIAS.

Exercise 1: Semantics of Boostan

2 Points

In the lecture we defined the semantics for the assignment statement and the semantics for the concatenation of two statements. Use both definitions and compute the relation $\llbracket x := x-y; y := x+1; \rrbracket$. Assume that we have $V = \{x, y\}$, $\mu(x) = \mathbb{Z}$ and $\mu(y) = \mathbb{Z}$.

Exercise 2: Program Semantics

3 Points

In the lecture we defined the semantics of Boostan programs by assigning a relation to each statement. Compute this relation for the Boostan program $P_{\text{pow}} = (V, \mu, \mathcal{T})$ with $V = \{e, x, y, z\}$, $\mu(e) = \mu(x) = \mu(y) = \mu(z) = \mathbb{Z}$, and \mathcal{T} a derivation tree for the program code shown below. List all intermediate steps, i.e., state the relation for each sub-statement.

```
e := 1;
z := 0;

while (z < y) {
  e := e * x;
  z := z + 1;
}
```