

Program Analysis and Verification
Course 0368-4479 / 2017/18 - Semester B
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Home Work Assignment #1

Due: 16/April/2018

In the following, we refer to the “Semantics with Application” book as “the book”.
The book can be found here: http://www.daimi.au.dk/~bra8130/Wiley_book/wiley.html.

1. Solve Ex 2.8 , 2.11, and 2.18 in the book.
2. In the previous question, you were asked to extend the While language with a new construct (a for loop). Extend the proof of theorem 2.26 in the book (semantic equivalence) to handle for commands.
3. Solve Ex 2.34 in the book.
4. Solve Ex 6.10, 6.11, 6.14, 6.15 and 6.24 in the book.
5. Provide axioms for backward-reasoning and forward reasoning for the statement $\text{random}(x)$. Prove that your axioms are sound wrt to the natural semantics (infinite set of axioms):
$$\langle \text{random}(x), s \rangle \rightarrow s[x \mapsto n] \quad n \in \mathbb{Z}$$
6. Bonus: Solve Ex 6.25 in the book.