PD Dr. Jan-Georg Smaus, Alexander Schimpf SS 2011

# Theory I, Sheet 9

**Submission: hand in by 20th July 2011 before 16:00**

- The solutions should be submitted in English.
- You must work on your own and write down your own solution. This does not exclude occasional discussions with your fellow students, but solutions copied from other students will not be accepted.

## Exercise 9.1 - $\Sigma$-Algebras

[Points: 1+1+2+1]

1. Explain why $\widehat{\mathcal{J}}$ is required to be a total funtion.
2. Explain why $\widehat{\mathcal{J}}$ is required to be unique.
3. Define the ADT bool for the boolean algebra with the function symbols true, false, not, and, or, including the usual identities.
4. Give an implementation for the ADT bool.

## Exercise 9.2 - Stack ADT

[Points: 1+1+1+1+1]

Specify an ADT Stack($A$) for stacks. The operations available for this ADT should be as follows:

- new: Constructs a new empty stack.
- push: Adds an element to the top of the given stack.
- pop: Removes the top element of the given stack.
- top: Returns the top element of the given stack.
- isEmpty: Checks whether a given stack is empty.

Specify the signatures for these operations and define sensible identities for them. What are the constructors of the stack ADT?