
Softwaretechnik

<http://proglang.informatik.uni-freiburg.de/teaching/swt/2011/>

Exercise Sheet 12

Exercise 1: Javascript (3 Points)

Given the following Javascript code snippet:

```
s = "some random string";  
s.x = 42;  
s.x;
```

1. Use the JavaScript shell from <http://www.squarefree.com/shell/shell.html> to execute the above Javascript code. Which results do you get?
2. Change the first or second line of the example, such that executing the third line (`s.x;`) prints 42.
3. Explain the behavior you observe. What would you suggest to prevent such mysterious bugs from happening?

Exercise 2: Types for JAUS (5 Points)

Which of the following JAUS expressions are type correct? Give a type derivation for all type correct expressions. Assume that variable x is of type *int* and variable y is of type *boolean*.

1. $1 + \text{true}$
2. $23 + (47 - 11)$
3. $!(\text{!false})$
4. $y + x$
5. $!y$

Exercise 3: Evaluation of JAUS (4 Points)

Evaluate the following JAUS expressions as far as possible.

1. $23 + (47 - 11)$
2. $(1 + 1) + \text{true}$

Which of the resulting expressions are values?

Exercise 4: Type soundness (8 Points)

Prove the following theorem:

If $\vdash e_0 : t$ then there exists e_n such that $\vdash e_n : t$ and $e_0 \longrightarrow e_1 \longrightarrow \dots \longrightarrow e_{n-1} \longrightarrow e_n$.

Hint: The following lemma might be helpful. You don't need to prove it.

For every expression e_0 , there exists an expression e_n such that $e_0 \longrightarrow e_1 \longrightarrow \dots \longrightarrow e_{n-1} \longrightarrow e_n$ and no expression e_{n+1} exists with $e_n \longrightarrow e_{n+1}$.