

**Flolac 2010**  
**Operational Semantics**  
**Assignment 2: SOS , Due date: July 2**

1. Specify the semantics of the construct "repeat S until b" in the style of SOS. The semantics of the repeat-construct is not allowed to rely on the existence of a while-construct in the language.

2. (Exercise 2.21) Non-interference of statements:

Prove that

$$\text{if } \langle S_1, s \rangle \Rightarrow^* s' \text{ then } \langle S_1; S_2, s \rangle \Rightarrow^* (S_2, s')$$

that is, the execution of  $S_1$  is not influenced by the statement following it.

(Hint: by induction on the length of derivation sequence)

3. Prove that " $S_1; (S_2; S_3)$ " and " $(S_1; S_2); S_3$ " are semantically equivalent according to the SOS of While. Note that one direction ( $\rightarrow$ ) of proof is good enough.

(Hint: by Lemma 2.19 and Exercise 2.21)

4. (Extra credit) (Exercise 2.20) Suppose that  $(S_1; S_2, s) \Rightarrow^* (S_2, s')$ . Show (an example) that it is not necessarily the case that  $(S_1, s) \Rightarrow^* s'$ .