

Exercise Sheet 0

Attempt as many questions as you can during the exercise class, and work on the remainder at home. Hand in your solutions to the tutor in the Friday exercise class, on 22 Jan, 2009.

Exercise 1: Inductive definitions

- a. Give an inductive definition for the syntax of commands (“statements”) in a Java-like programming language. The language includes assignment statement, statement sequences, if-then-else statements and while statements.

Use the following symbols to stand for various syntactic classes:

- X for variables,
- E for expressions and
- C for commands

Curly braces $\{ \dots \}$ are often used to group statements for disambiguation.

- b. Draw all possible syntax trees for the following command:

$$a = E_1; \text{ if } (E_2) \ a = E_2 \text{ else } a = E_3; \ b = E_4$$

(where a and b are variables).

- c. Write an unambiguous version of the command that has a unique syntax tree.

Exercise 2: Production rules

Give a grammar for the above language using the production rule notation.

Exercise 3: Inference rules

- a. Give a system of inference rules that correspond to the induction definition in the first exercise.
- b. Give a derivation for the example statement in the first exercise. You can use either a tree form or a linear form for the derivation.