T-106.4200 Introduction to Compiling
Exam Oct. 22, 2012

Examiner: Jorma Tarhio

No written material is allowed in this exam. Submit at least one answer sheet, even if an empty one! Write on *each* answer sheet you submit the code of the course, the date, your name, and your student ID number.

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1. Answer shortly to the following questions:

(a) What is a lookahead symbol?

(b) To which direction do attribute values go in an S-attributed grammar?

(c) Why top-down parsing methods cannot handle left-recursive grammars?

(d) Why there are no syntax errors in an intermediate code?

(e) In a stack-based runtime system, what problem does the static link method attempt to solve, and how does it work?

(10 p)

2. Construct an NFA for $(ab|bc)^* d$ using Thompson's method. (10 p)

3. Consider the following grammar:

$$
\begin{array}{lcl}
S & \rightarrow & [\,D\,] \\
D & \rightarrow & H\,T \\
H & \rightarrow & (\,D\,) \mid \textbf{id} \\
T & \rightarrow & (\,L\,)\,T \mid [\,L\,]\,T \mid \varepsilon \\
L & \rightarrow & D\,R \\
R & \rightarrow & ,\,D\,R \mid \varepsilon
\end{array}
$$

which has terminals: , [ ] ( ) **id**

(a) Compute the FIRST and FOLLOW sets of the nonterminals.

(b) Construct the LL(1) parsing table.

(c) Is the grammar LL(1)? Why? (5+7+2 p)

4. Consider the language $L = \{udv \mid u, v \in A^+,\ A = \{a, b, c\},\ u$ contains exactly two a letters and v exactly one b letter$\}$, e.g. $abadbcac \in L$. Define L with an attribute grammar. (9 p)

P.T.O.