Introduction to Compilation Techniques
Mid-semester examination

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1. Consider the following context-free grammar

    - $S \rightarrow X$
    - $X \rightarrow DE$
    - $D \rightarrow PD$
    - $D \rightarrow \epsilon$
    - $E \rightarrow QE$
    - $E \rightarrow \epsilon$
    - $P \rightarrow id\ id$
    - $Q \rightarrow id = id$

    It has nonterminal symbols, S, X, D, E, P, Q and the terminal symbols, id, $=$. Answer the following question.

    (a) Is the grammar ambiguous ?   (2)

    (b) Compute FIRST and FOLLOW sets of all non-terminal symbols. (4+4)

    (c) Build LR(0) automaton and draw the SLR parsing table.   (4+4)

    (d) Is the grammar SLR(1) ? Why ?   (2)

2. An RL(0) parser is similar to an LR(0) parser except that it scans the input from right-to-left. We can speak of RL(0) items as productions with a dot marking the position of what has been matched so far from the right side instead of the left. For example, if we have an RL(0) item of the form $A \rightarrow x.y$, it means that we have matched y so far and are looking forward to matching x. Similarly, whereas an LR(0) reduce item has the form $A \rightarrow v.$, with the dot at the end, an RL(0) reduce item has the form $A \rightarrow .v$, with a dot at the beginning, since it means we've matched all of v in reverse order. Is there a grammar that is RL(0) but not LR(0)? If so, show what it is and explain both why it is not LR(0) and why it is RL(0). If not, explain why not.   (5)