Homework 5 - LR

<u>Due Date:</u> Tuesday, November 22, 2005, 2:00

Your Name:____

1. Can a non-recursive predictive parser handle all LR(1) grammars?

____

2. What sort of derivation does a bottom-up parser discover?

____

3. In bottom-up parsing, at each step, we are looking for a what? (One word.)

____

4. What are the four possible actions in a shift-reduce parser?

____

____

____

____

5. In a shift action, what happens?

____

____

6. In a reduce action, assume we are reducing by the rule
S → **a** S **b** C
Show the first few symbols on top of the stack. (Assume we are using shift-reduce parsing, in general, so you don’t need to show any states. Please draw your stack so that the top of the stack is toward the top of the page.)

7. The set of grammars that can be parsed with the LR algorithm is

_____ **a proper subset of**

_____ **a proper superset of**

_____ **equal to**

_____ **unrelated to**

the set of grammars parsable with predictive parsing. (Please check the correct relation.)

8. Can an LR grammar be ambiguous? __________

9. In the LR parsing algorithm, what kinds of things are pushed onto the stack?

____

10. In LR parsing, what are the two tables called?

____

11. Here is a grammar; give the set of all LR(0) items for this grammar.

$S' \rightarrow S$
$S \rightarrow (A) \mid \varepsilon$
$A \rightarrow S , A \mid S$

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12. What algorithm does YACC use? _____________

13. What is the input to YACC? _____________

What is the output? _____________

14. What is the difference between an LR(0) and an LR(1) item?

____

15. Here is a grammar:

$$
\begin{aligned}
S &\rightarrow \underline{\mathbf{b}}\ T\ \underline{\mathbf{c}} \\
&\rightarrow S\ T\ S\ \underline{\mathbf{g}} \\
&\rightarrow T\ \underline{\mathbf{d}}\ S\ \underline{\mathbf{h}} \\
&\rightarrow \varepsilon \\
T &\rightarrow \underline{\mathbf{a}}\ T \\
&\rightarrow \varepsilon
\end{aligned}
$$

What is FIRST(S)? ______________________________

What is FIRST(T)? ______________________________

What is FOLLOW(S)? ______________________________

What is FOLLOW(T)? ______________________________

16. In bottom-up parsing, we look for a ____ and when we find one, we reduce. Otherwise, we

___________________________________.

17. Here is a grammar:

$$
\begin{aligned}
S' &\rightarrow E \\
E &\rightarrow E\ \mathbf{+}\ T \\
&\rightarrow T \\
T &\rightarrow T\ \mathbf{*}\ F \\
&\rightarrow F \\
F &\rightarrow \mathbf{(}\ E\ \mathbf{)} \\
&\rightarrow \underline{\mathtt{id}}
\end{aligned}
$$

List all the LR(1) items in CLOSURE ({ S' → • E , **(** })

___________________ ___________________ ___________________

___________________ ___________________ ___________________

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18. Using the grammar from the previous question...

Let $CC_i = \{ E \rightarrow E \bullet \mathbf{+}\ T\ ,\ \mathbf{(}$

$E \rightarrow T \bullet ,\ \mathbf{(}\ \}$

What is GOTO (CC_i, **+**)?

___________________ ___________________ ___________________