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CSC 173
Write-Up

Grammar:

The following grammar was originally based on that by Aho and Ullman in their *Foundations of Computer Science*. The grammar was modified to eliminate left recursion, add left factoring, and then add extra operators.

1. <Expression> → <Term><ExpTail>
2. <ExpTail> → +<Term><ExpTail>
3. <ExpTail> → **-**<Term><ExpTail>
4. <ExpTail> → <PostIncrement><ExpTail>
5. <ExpTail> → **ε**
6. <PostIncrement> → <Increment><IncrementTail>
7. <Term> → <Factor><TermTail>
8. <TermTail> → *<Factor><TermTail>
9. <TermTail> → /<Factor><TermTail>
10. <TermTail> → **%**<Factor><TermTail>
11. <TermTail> → **ε**
12. <Factor> → <FactorHead><FactorTail>
13. <FactorHead> → <Increment><Sign><FactorHead>
14. <FactorHead> → <Sign><Increment><FactorHead>
15. <FactorHead> → **(**<Expression>**)**
16. <FactorHead> → <Number>
17. <Sign> → +
18. <Sign> → **(+)**
19. <Sign> → **-**
20. <Sign> → **(-)**
21. <Sign> → **ε**
22. <Increment> → **(++)**
23. <Increment> → **(--)**
24. <Increment> → **ε**
25. <FactorTail> → **!**
26. <FactorTail> → ^<Factor>
27. <FactorTail> → **ε**
28. <IncrementTail> → <TermTail>
29. <IncrementTail> → <FactorTail>
30. <IncrementTail> → **ε**

Parse Table:

	+	-	(+)	(-)	(++)	(--)	*	%	/	(	)	!	^	*N*	;
E	1	1	1	1	1	1				1				1	
ET	2	3			4	4					5				5
PI					6	6									
T	7	7	7	7	7	7				7				7	
TT	11	11			11	11	8	9	10		11				11
F	12	12	12	12	12	12				12				12	
FH	14	14	14	14	13	13				15				16	
S	17	19	18	20	21	21				21				21	
I	24	24	24	24	22	23				24	24			24	24
FT	27	27	27	27	27	27	27	27	27		27	25	26		27
IT	30	30					28	28	28		30	29	29		30

(*N* is any number.)

Deterministic Finite Automata:

This program uses several deterministic finite automata, one for each type of token. (**BOLD** is accepting state.)

T_EOF

STATE	END	OTHER TERMINALS
start	done	reject
done		
reject	reject	reject

T_SPACE

STATE	SPACE	OTHER TERMINALS
start	got_space	reject
got_space	got_space	done
done		
reject	reject	reject

T_NL_SPACE

STATE	SPACE	EOLN	OTHER TERMINALS
start	got_space	got_nl_space	reject
got_space	got_space	got_nl_space	reject
got_nl_space	got_nl_space	got_nl_space	done
done			
reject	reject	reject	reject

T_UNARY

STATE	**(**	+	**-**	**)**	OTHER TERMINALS

start	got_lparen	reject	reject	reject	reject
got_lparen	reject	got_incr	got_decr	reject	reject
got_incr	reject	reject	reject	done	reject
got_decr	reject	reject	reject	done	reject
done					
reject	reject	reject	reject	reject	reject

T_INCREMENT
T_OPERATOR
T_LITERAL
T_LPAREN
T_RPAREN
T_SEMIC
T_DOT