CMSC 430 MIDTERM
November 2, 1995

1 [50]. Consider the following grammar G1. For each class listed below, determine if G is of that class. Give a complete reason why. Your answer can be a simple sentence or may have to be the complete transition table for the parsing algorithm.

\[ G1: \]

\[ S \rightarrow T \]

\[ T \rightarrow (U) | U | V | V \]

\[ U \rightarrow a | T \]

\[ V \rightarrow a | T \]

(a) LL(0)
(b) LL(1)
(c) SLR(0)
(d) SLR(1)
(e) LR(1)
(f) LALR(1)
(g) General precedence

2 [20]. Consider grammar G2:

\[ G2: \]

\[ T \rightarrow (U) | U | V | V \]

\[ U \rightarrow a \]

\[ V \rightarrow a \]

(a) Show that G2 is a regular language by giving a regular grammar for it.
(b) Give a finite state automaton that accepts G2.
(c) Give a minimal state finite state automaton for G2.
(d) Give a finite state automaton over the same alphabet for all strings NOT in G2.

3 [10]. Give the regular expression, finite state automaton, and regular grammar for all binary strings representing integers divisible by 4.

4 [10]. (a) Give the postfix for:

1. \( A \ast B + C \ast D + E \ast (F - G) \)
2. \( A \ast B - (C - D) \)

(b) Give the prefix for each.

5 [10] Show that a grammar which is ambiguous cannot be a precedence grammar.