

Assignment #1

CS3300

- [5] **Regular Expressions** Construct a regular expression to accept
 - A six character identifier consisting of an alphabetic character followed by zero to five alphanumeric characters.
 - All string of a's and b's that do not contain the substring abb.
 - Java string literals.
 - Money in ₹ represented as a positive decimal number rounded to the nearest one-hundredth. They start with ₹, have commas separating each group of three digits to the left of the decimal point and end with two digits to the right of the decimal point, (for example ₹2,345.67).
 - The set of algebraic expression over the alphabet $\Sigma = \{+, -, *, /, (,), \text{id}\}$. These cover addition, subtraction, multiplication, division over **ids**.
- [5] **Context Free Grammar** Write the CFG for
 - the BNF notation for CFGs.
 - the set of all strings of 0s and 1s that are palindromes.
 - the set of all strings of 0s and 1s with an equal number of 0s and 1s.
 - the set of all strings of 0s and 1s with unequal number of 0s and 1s.
- [10] **Parsing** Give a leftmost derivation, a rightmost derivation, a parse tree for the following grammars and strings. Argue if the grammar is ambiguous or unambiguous, without resorting to building the parse table.
 - $S \rightarrow 0 S 1 | 01$ with the string 000111.
 - $S \rightarrow + S S | * S S | a$ with the string $+ * aaa$.
 - $S \rightarrow S (S) S | \epsilon$ with the $((()))$.
- [10] **SLR Parsing** Construct the SLR sets of items and their GOTO functions for the three (augmented versions of) grammars of Q3. Indicate any action conflicts in your sets of items and construct the SLR-parsing table, if one exists.
- [5] **LR(0) parsing** Consider the following grammar:
 $S \rightarrow A S | b$
 $A \rightarrow S A | a$
 - Is the grammar LR(0)? Build the LR(0) items and the parsing table to answer this question. (b) Consider the input $abab$ – if you answer the question (a) in affirmative, show the sequence of actions, considering an arbitrary action for each conflict, else give the conflict free sequence of actions and the parse tree
- [10] **LR(1) parsing** Construct the canonical collection of set of LR(1) items for the following augmented grammar and the (augmented versions of) grammars of Q3, Action and GOTO tables. Are these grammars LR(1)?
 $S' \rightarrow S$
 $S \rightarrow A a$
 $A \rightarrow B C | B C f$
 $B \rightarrow b$
 $C \rightarrow e$
- [5] **LALR(1) parsing** Construct the LALR(1) sets of items for the (augmented versions of) grammars of Q3.