

# School of Computer Science and Software Engineering

## CS3322 Programming Languages and Implementation

### Assignment 4

#### Due 5pm Thursday 24th of October

The purpose of this assignment is to practice LR parsing.

Consider the following grammar with terminal symbols

$a \ b \ c$

non-terminal symbols  $S, A, B, X, Y$  where  $S$  is the start symbol and productions

$$\begin{aligned} S &\rightarrow X c Y \\ X &\rightarrow A \mid B \\ Y &\rightarrow A \mid B \\ A &\rightarrow a a A \mid a a \\ B &\rightarrow a b B \mid a b \end{aligned}$$

- Is the language defined by this grammar regular? If so, give an equivalent regular expression that defines the same language. [1 marks]
- Give the canonical collection of LR(0) items for this grammar. (Note: to do this apply exactly the algorithm given in Lecture VII and use the grammar symbols in the following order:  $\{S, A, B, X, Y, a, b, c\}$ ). [1 marks]
- Compute the action and goto tables for this grammar. [2 marks]
- Detail how the sentence  $a b c a a$  would be parsed with a LR parser using the tables you gave in (c). For each step of the process give the input, the parser actions (shift/reduce) and stack state. [1 marks]

#### Submission Instructions

The above exercises contribute 5% to your total CSE3322 mark.

The assignment is due **5pm Thursday 24th of October**.

Submission for this assignment is not(!) electronic. Please submit your solutions in the usual way to the general office.

Assignments handed in after the due date will attract a late penalty of 5% per day unless special consideration applies or there has been prior agreement in writing from the lecturer. No submission will be accepted later than one week after the due date.