CS 2210: Compiler Design

Homework #3

Due Time: March 13th, 2017

1. (10 points) Regarding LR parsing algorithm.
   a) Explain in your own words why ambiguous grammars can never be LL or LR.
   b) Explain in your own words why LR is more powerful than LL, given the same looka-
      head.

2. (30 points) For each of the below grammars, answer the following questions:
   (1) Is the grammar LR(1)?
   (2) Is the grammar LALR(1)?
   (3) Is the grammar SLR(1)?
   Justify your answer regardless of whether it is yes or no. The justification may require you
to draw a parsing table. Or you may refer to the Venn diagram of grammar relationships we
learned in class. Or you may give some other reasonable qualitative argument.

   a) (10 points) $\Sigma = \{v, =, ;, +, (, )\}.$
      $S \rightarrow v = A ;$
      $A \rightarrow P E$
      $P \rightarrow P v = | \varepsilon$
      $E \rightarrow E + T | T$
      $T \rightarrow v | (A )$

   b) (10 points) $\Sigma = \{a, b, c\}.$
      $S \rightarrow bAb | Ac | ab$
      $A \rightarrow a$

   c) (10 points) $\Sigma = \{a, b, c, d\}.$
      $S \rightarrow Aa | bAc | Bc | bBa$
      $A \rightarrow d$
      $B \rightarrow d$