CS 1622: Introduction to Compiler Design

Homework #1

Due Time: February 17th, 2016

1. (10 points) Construct a deterministic finite state transition graph for regular expression

$$((0|1)^*0)|(001)$$

   Here we have $\Sigma = \{0, 1\}$.

2. (10 points) Construct regular expressions for the following languages.

   a) All strings of lowercase letters that contain the five vowels in order.

   b) Strings with even number of quotes. That is, 'abc', abc"dd, aa'a'a'a' are legal strings while 'a, 'a'a'ab'a' are illegal strings.

3. (10 points) Construct grammars for the following languages.

   a) The set of strings of 0s and 1s with an equal number of 0s and 1s.

   b) The set of strings of 0s and 1s with an unequal number of 0s and 1s.

4. (10 points) Given the following grammar, construct the first and follow sets for each non-terminal symbol.

$A \rightarrow BAc \mid FE$
$B \rightarrow bEF \mid g$
$E \rightarrow e \mid \varepsilon$
$F \rightarrow f \mid EH$
$H \rightarrow h$

5. (10 points) Determine whether each of the following grammars is LL(1) or not. If no, give the reason.

   a) $S \rightarrow [S \mid A$
   $A \rightarrow [A] \mid \varepsilon$

   b) $S \rightarrow ABc$
   $A \rightarrow a \mid \varepsilon$
   $B \rightarrow b \mid \varepsilon$

   c) $S \rightarrow ABBA$
   $A \rightarrow a \mid \varepsilon$
   $B \rightarrow b \mid \varepsilon$

   d) $S \rightarrow aAbc|bAc$
   $A \rightarrow b \mid \varepsilon$