CS 5810 Homework Assignment #1
Due Date: *Monday, October 7, 2018 in class*

1. (30 pts.) For the regular expression

$$(0 \mid 1)^*10(0 \mid 1)^*$$

   (a) Use Thompson's construction to construct an NFA for the regular expression.

   (b) Convert the NFA to DFA using the algorithm from class.

   (c) Minimize the DFA using the algorithm from class

   (d) Write pseudo-code for a table-driven scanner for the minimized DFA.

2. (20 pts.) Convert the following grammars to LL(1) form.

   (a)
$$\begin{array}{lcl} A & \rightarrow & Bc \mid Cdd \\ B & \rightarrow & aa \mid cc \mid Bb \\ C & \rightarrow & eef \mid eeg \end{array}$$

   (b)
$$\begin{array}{lcl} Z & \rightarrow & Yy \\ Y & \rightarrow & zyw \mid Xx \\ X & \rightarrow & Zuv \end{array}$$

3. (50 pts.) Construct the $LR(1)$ item sets and parse tables for the following grammars:

   (a)
$$\begin{array}{lcl} S & \rightarrow & A \\ A & \rightarrow & bB \mid a \\ B & \rightarrow & cC \mid cCe \\ C & \rightarrow & dA \end{array}$$

   (b)
$$\begin{array}{lcl} S & \rightarrow & Aa \mid bAc \mid dc \mid bda \\ A & \rightarrow & d \end{array}$$

   Are these grammars LR(1)? LALR(1)?