1. For the regular expressions \((a|b)^*\) and \((a^* | b^*)^*\)
   
   (a) Construct an NFA using the algorithm presented in class
   (b) Reduce the NFA to a DFA using the Subset algorithm
   (c) Minimize the DFA using Moore reduction
   (d) Compare the two minimized DFAs. Are they identical up to state names?

2. Write a grammar for the following languages
   
   (a) All strings of 0’s and 1’s that have the same number of 0’s and 1’s
   (b) All strings of 0’s and 1’s that have more 0’s than 1’s
   (c) All balanced pairs of left and right parentheses (e.g., ”()”, ”((())”).

3. Consider the grammar
   
   \[ S \rightarrow (L) | a \]
   \[ L \rightarrow L , S | S \]

   and the strings ”(a,a)” and ”(a,(a,a))”

   A left-most derivation is one which the left-most nonterminal is replaced in each step of the derivation. A right-most derivation is one which the right-most nonterminal is replaced in each step of the derivation.

   (a) Find all left-most derivations for each string
   (b) Find all right-most derivations for each string
   (c) Find the parse tree for each derivation
   (d) Can you distinguish between the two parse trees?

4. Consider the grammar
   
   \[ S \rightarrow aSbS | bSaS | \epsilon \]

   and the string ”abab”

   (a) Find all left-most derivations for the string
   (b) Find all right-most derivations for the string
   (c) Find the parse tree for each derivation
   (d) Can you distinguish between the two parse trees?