1. Is each of the following language regular? If yes, why? If not, why?
   (a) [5] All strings of a's and b's
   (b) [5] All strings of a's and b's that contains no two consecutive b's
   (c) [5] All strings of a's and b's that contains an even number of a's and an even number of b's
   (d) [5] All strings of a's and b's that contains exactly as many a's as b's

2. Consider the following languages
   L1 = the language denoted by the regular expression ab+
   L2 = the language denoted by the regular expression ab*
   L3 = the language denoted by the regular expression b*
   Let $L = L1 \cup L2 \cup L3$
   (a) [5] Write down the regular expression that denotes L
   Note. The answer cannot be ab+ | ab* | b*
   (b) [10] Use Thompson's (subset) construction to find its NFA that accepts L
   (c) [10] Convert the NFA to a DFA
   (d) [5] Minimize the DFA

3. [10] Eliminate left recursion from the grammar
   $A \rightarrow Ba \mid Aa \mid c$
   $B \rightarrow Bb \mid Ab \mid d$

4. Consider the following grammar G
   $S \rightarrow (L) \mid a$
   $L \rightarrow L, S \mid S$
   (a) [5] Rewrite G to G' to eliminate left recursion
   (b) [5] Write down the FIRST and FOLLOW sets for all nonterminals of G'
   (c) [5] Show the predictive parsing table of G'
   (d) [5] Show the process of parsing the string "(a, (a, a)) $" by the predictive parser

5. [10] Find the grammar that generates the language represented by the regular expression ab*

6. Consider the following grammar G
   E → E and E | E or E | not E | true | false
   (a) [5] Why G is not LL(1)?
   (b) [10] Rewrite G to G' so that G' is LL(1)

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m+ 5

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