Exercises for seminar

1) For each of the following languages, construct a DFA that accepts the language:
   (a) The set of binary strings beginning with 010.
   (b) The set of binary strings ending with 101.
   (c) The set of binary strings beginning with 10 and ending with 01.
   (d) The set of binary strings having a substring 010 or 101.
   (e) The set of binary strings in which the last five symbols contain at most three 0's.
   (f) The set of binary strings w in which $\#_1(w) + 2\#_0(w)$ is divisible by 5, where $\#_a(w)$ is the number of occurrences of the symbol a in string w.
   (g) The set of strings over the alphabet $\{1,2,3\}$ in which the sum of all symbols is divisible by 5.
   (h) The set of strings over the alphabet $\{0,1,2\}$ which are the ternary expansions (base-3 representations) of positive integers which are congruent to 2 modulo 7.
   (i) The set of binary strings in which every block of four symbols contains at least two 0's.
   (j) The set of binary strings in which every substrings 010 is followed immediately by substring 111.
2) For each of the following languages, use the product automaton method to construct a DFA that accepts the languages:
   (a) The set of binary strings beginning with 010 or ending with 101.
   (b) The set of binary strings having a substring 010 but not having a substring 101.
   (c) The set of binary strings beginning with 010, ending with 101 and having a substring 0000.
3) For each of the following languages, use the checker method to construct a DFA that accepts the languages:
   (a) The set of all binary strings having a substring 00 or ending with 01.
   (b) The set of all binary strings having a substring 00 but not ending with 01.
   (c) The set of binary strings beginning with 010 or ending with 101.
   (d) The set of binary strings beginning with 010, ending with 101 and having a substring 0000.