CENG213 Assignment 1

07.11.2023

Due Date: 21.11.2023

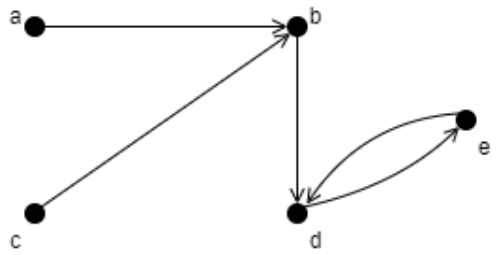
1) (15 pts) Construct a DFA to accept the following language:
   L = { w ∈ {0,1}* : w has even number of substrings 101 }

2) (15 pts) Describe the equivalence classes (≈L) for the following language:
   L = { w ∈ {0, 1}* : no three adjacent characters are the same }

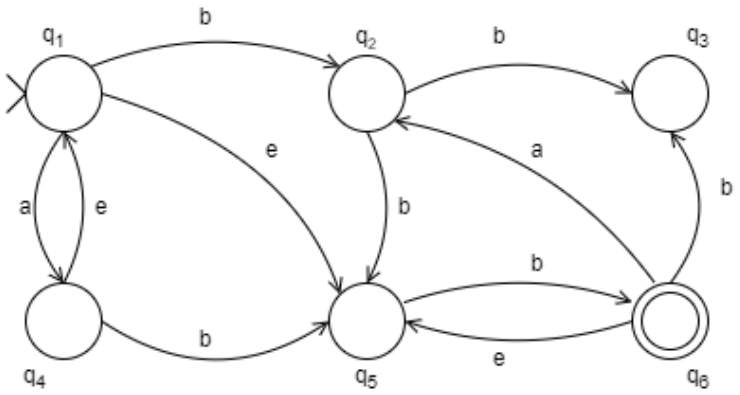
3) (15 pts) Give a context-free grammar generating the complement of the following language:
   L = { 0^n1^m | n ≥ 0, m ≥ 1}

4) (15 pts) Design a DFA that recognizes the language L over the alphabet Σ = {0, 1} where L consists of all strings that, when interpreted as binary numbers, are divisible by 3 (i.e., the binary representation of the number is a multiple of 3).

5) (10 pts) Find the transitive closure of the directed graph shown below using the Warshall algorithm.



6) (15 pts) Use the state minimization algorithm on the NFA shown below. Show your steps clearly.



7) (15 pts) Draw the state diagram for the nondeterministic finite automaton that accepts this language: ((*aba*)* ∪ *b*)* ∪ (*aa* ∪ *b**)*