

Quiz #4 CS361 Spring 2017

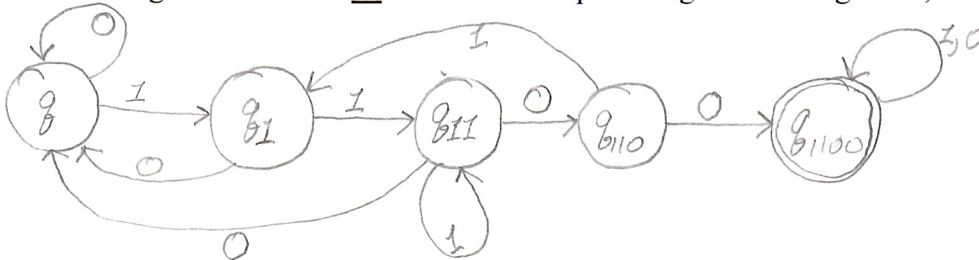
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I. True or False (1 Point each for the best 8, answer all)

- F 1. The set of states Q in a DFA can be empty. When Q is not empty, the DFA can have more than one start state.
- F 2. Let's A , p , and s be defined as in the Pumping Lemma, if $s = xyz$, then $s' = xz$ must also be in A . In addition, the Pumping Lemma for NFA is mostly used to prove that a language is actually regular.
- T 3. Any language accepted by a NFA can also be accepted by a DFA.
- T 4. The class of regular language is closed under the concatenation operation.
- F 5. A NFA is considered as a special case of a DFA.
- F 6. If machine M has two input symbols that transit to q_2 from q_1 , then M cannot be a DFA.
- F 7. Every CFG has an equivalent NFA, and every DFA has an equivalent CFG.
- F 8. If a DFA has n states, it cannot accept strings with a length greater than n^2 .
- T 9. $A = \{0^n 1^n\}$ can be accepted by a PDA.

II. Short answers (2 points each)

1. Show your state diagram of a NFA or DFA that accepts strings containing 1100, such as 0011001.



2. Let $A = \{a, b\}$ and $B = \{0, 1\}$ show $A \cup B$ and $A \circ B$. Then explain what is A^* and show all strings in A^* that have a length smaller than 3.

$$A \cup B = \{a, b, 0, 1\}$$

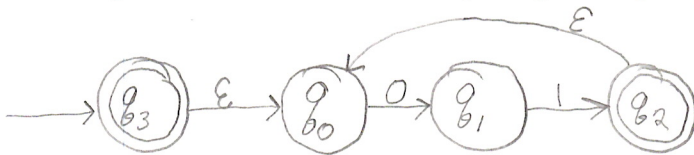
$$A \circ B = \{a0, a1, b0, b1\}$$

A^* All the combinations of elements of A .

$$A^* = \{\epsilon, a, b, aa, ab, ba, bb, \dots\}$$

II. Short answers (4 points)

1. Design a DFA or NFA that accepts regular expression $(01U10)^*$.



2. Design a PDA that accepts $E = \{0^i 1^j \mid i > j\}$. You may have to use the back page.

Since $i > j$, there is more 0's than 1's. So a PDA would not work on this language. I have made a graph on the back of the page that I think might work.

