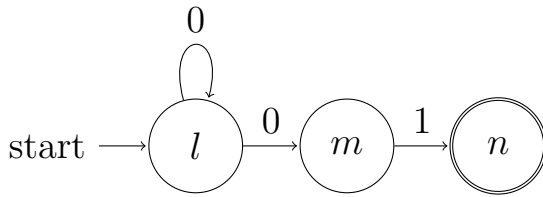


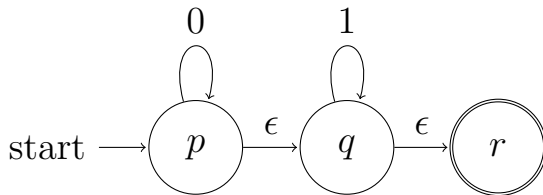
CS2200 : Tutorial 2

Wednesday, 12 February 2025

1. Describe the languages accepted by the following NFA.



2. Given the following NFA with epsilon transitions, construct an equivalent NFA without epsilon transitions.



3. Draw state diagrams representing non-deterministic finite automata that will accept the following languages. The alphabet is $\Sigma = \{a,b\}$. Pay attention to specific instructions and constraints.

- (a) The language $S = \{s \mid \#s \text{ is divisible by either 3 or 5}\}$, The automaton should have separate loops for divisibility by 3 and by 5, which are then combined using epsilon transitions.
- (b) The language $a^*b^*a^+$ with three states. Missing transitions can be assumed to lead to an implicit dead state (i.e., no need to show it explicitly).
- (c) The language comprising all strings that contain an even number of a's or contain exactly two b's.

4. Let $\Sigma = \{a, b\}$, and define the languages A and B as follows:

- A consists of all strings over Σ with even length.
- B consists of all strings over Σ with odd length.

The language L is defined such that every string in L is formed by alternating **non-empty** substrings from A and B , starting with a substring from A and ending with a substring from B . Design a NFA that recognizes L .

5. Describe the language accepted by the given NFA and construct an equivalent DFA using subset construction.

