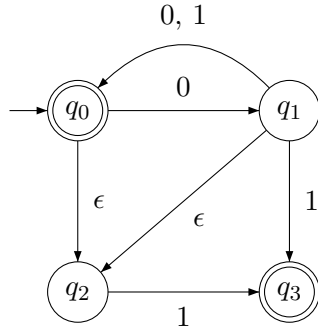


CS 273: Intro to Theory of Computation, Fall 2007

Head-banging 2 (19-21 Sept)

1. Basic NFA practice

Let $\Sigma = \{0, 1\}$, and let $N = (Q, \Sigma, \delta, q_0, F)$ be the NFA diagrammed below.



- Write out F using “{ }” notation.
- What is $\delta(q_0, 0)$?
- What is $\delta(q_1, 1)$?
- What is $\delta(q_1, \epsilon)$?
- What is $E(\{q_1, q_3\})$?

2. Converting Regular expressions to NFA's

For each of the following regular expressions, use the algorithm presented in class (and in Sipser) to produce an NFA which recognizes it.

- $a^* + b^*$
- $(a^*b + c^*a)^*$

3. More Manipulating formal definitions

Let $N = (Q, \Sigma, \delta, q_0, F)$ be an NFA. Using the “tuple” notation, define a new NFA N' such that

$$L(N') = \{wt \mid w \in L(N), \text{ and } t \in \Sigma\}.$$

4. More Structural Induction

Recursively define $T \subset \mathbb{Z}$ as the smallest set satisfying the following rules:

Rule 1: $4, 10 \in T$

Rule 2: If $a, b \in T$, then $a - b \in T$

- (a) Give a nonrecursive definition of T .
- (b) Prove that your answer is correct.