

# CSE 390z: Mathematics for Computation Workshop

## QuickCheck: 8. DFAs and NFAs Solutions (due Tuesday, March 3)

Please submit a response to the following questions on Gradescope. We do not grade on accuracy, so please submit your best attempt. You may either typeset your responses or hand-write them. Note that hand-written solutions must be legible to be graded.

We have created **this template** if you choose to typeset with Latex. **This guide** has specific information about scanning and uploading pdf files to Gradescope.

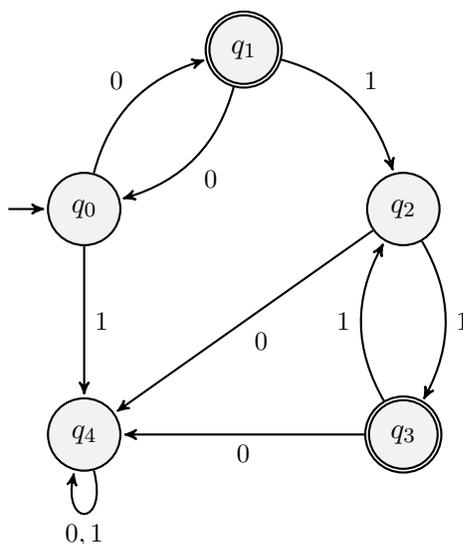
### 0. Constructing DFAs and NFAs

- (a) Let  $\Sigma = \{0, 1\}$  and  $L$  be the language over  $\Sigma$  such that  $w \in L$  iff  $w$  contains an even number of 1s and odd number of 0's and does not contain the substring 10.

Give a DFA to accept strings in  $L$ .

#### Solution:

Note that a binary string not containing 10 as a substring must be of the form  $0^*1^*$ . The additional constraints mean we are looking for numbers of the form  $0^x1^y$  with  $x$  odd and  $y$  even.



$q_4$ : strings that contain the substring 10 or are of the form  $0^x11^*$  with  $x$  even.

$q_3$ : strings of the form  $0^x1^y$  with  $x$  odd and  $y$  even

$q_2$ : strings of the form  $0^x1^y$  with  $x$  and  $y$  odd

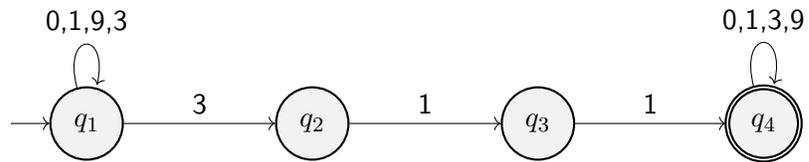
$q_1$ : strings of the form  $0^x$  with  $x$  odd

$q_0$ : strings of the form  $0^x$  with  $x$  even

(b) Let  $\Sigma = \{0, 1, 3, 9\}$  and  $L$  be the language over  $\Sigma$  such that  $w \in L$  iff The string "311" is a substring of  $w$ .

Give an NFA to accept strings in  $L$ .

**Solution:**



## 1. Video Solution

Watch **this** solution video **after** making an initial attempt. Then, answer the following questions.

- (a) What is one thing you took away from the video solution?
- (b) **Optional:** How did you like the Imposter Syndrome Workshop? Any feedback for future quarters?