CS 374 Spring 2018
Homework 1

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Problem 3 solutions:

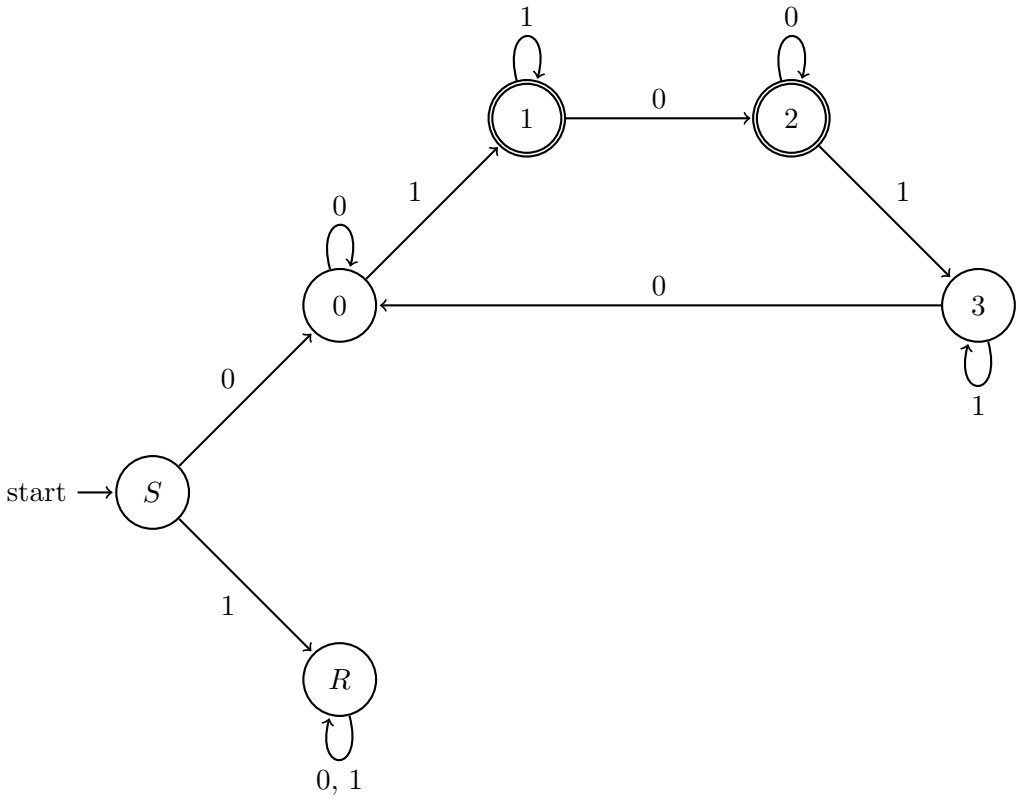
Let us define DFA $M = (Q, \Sigma, \delta, s, A)$ such that M defines the language

$$L = \{w \in \{0,1\}^* \mid w \text{ starts with 0 and has an odd number of 01 substrings}\}$$

- $Q = \{S, R, 0, 1, 2, 3\}$
- $A = \{1, 2\}$
- $s = S$
- $\Sigma = \{0, 1\}^*$
- q is defined by the following. Note that for some cases we use the numerical values of the state names to determine the next state.
  - $\delta(S, 0) = 0$
  - $\delta(S, 1) = R$
  - $\delta(R, 0) = R$
  - $\delta(R, 1) = R$

$$\delta(q, 0) = \begin{cases} q & \text{if } q \bmod 2 = 0 \\ (q+1) \bmod 4 & \text{if } q \bmod 2 = 1 \end{cases}$$

$$\delta(q, 1) = \begin{cases} (q+1) \bmod 4 & \text{if } q \bmod 2 = 0 \\ q & \text{if } q \bmod 2 = 1 \end{cases}$$


1
0
1
0
2
0
1
1
0
0
3
0
1
start
S
1
R
0, 1