

## Assignment 4

### Exercise 1:

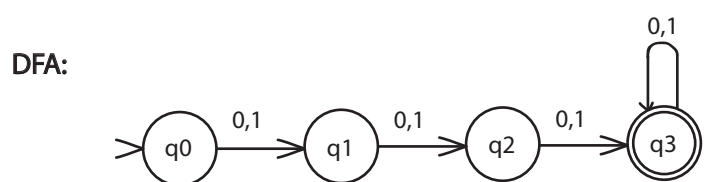
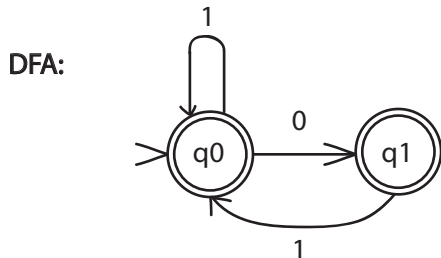
Construct both regular expression and deterministic automata that accept the following languages over  $\{0, 1\}$ .

a) Strings that do not contain 00.

b) Strings that contain at least three symbols.

RegEx:  $r = (0?)(10?)*$

RegEx:  $r = (0|1)(0|1)(0|1)(0|1)^*$

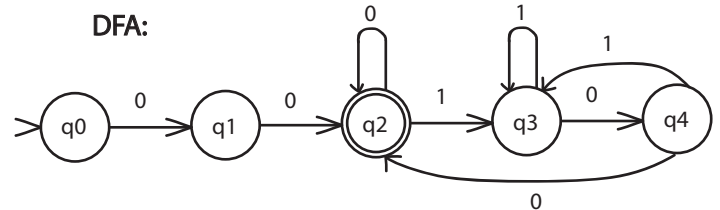
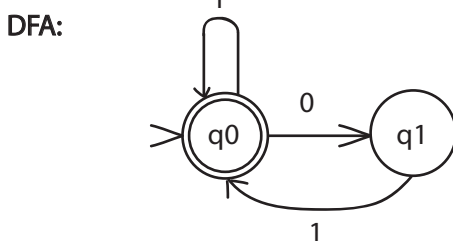


c) Strings where each 0 is directly followed by 1.

d) Strings that both start and end with 00.

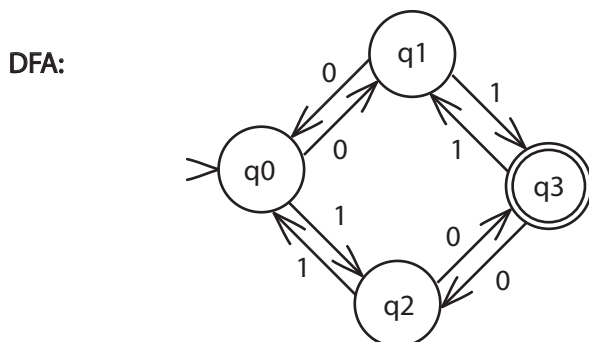
RegEx:  $r = (01|1)^*$

RegEx:  $r = (00)((0|1)^*(00))^*(0)^*$



e) Strings having an odd number of 0:s and an odd number of 1:s.

RegEx:  $r = ((00|11)^*(01|10)(11|00)^*(10|01)(00|11)^*((11|00))^*(01|10)(00|11)^*$



### Exercise 2:

Present a deterministic finite automata and a regular expression for the language over  $\{0, 1, 2, 3, 4, 5\}$  where each string satisfies all the following criteria:

- The string may either be empty or start with 0.
- Either 1 or 3 must follow after 0.
- 2 must follow after 1.
- 0 may follow after 2, otherwise the string must end.
- 5 must follow after 3, but there may be zero or more 4 between 3 and 5.
- 0 may follow after 5, otherwise the string must end.

RegEx:  $r = (0?(12|34^*5))^*$

DFA:

