CS355 Worksheet 1

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February 2023

1 DFA Definition

1.1 Two DFAs

1.1.1 M_1

- What is the start state ?
  q_1.
- What is the set of accept states?
  $\{ q_2 \}$
- What sequence of states does the machine go through on input aabb?
  $\{ q_1 \xrightarrow{a} q_2 \xrightarrow{a} q_3 \xrightarrow{b} q_1 \xrightarrow{b} \underline{q_1} \}$
- Does the machine accept the string aabb ?
  No.
- Does the machine accept the string ϵ ?
  No.

1.1.2 M_2

- What is the start state ?
  q_1.
- What is the set of accept states?
  $\{ q_1, \ q_4 \}$
- What sequence of states does the machine go through on input aabb?
  $\{ q_1 \xrightarrow{a} q_1 \xrightarrow{a} q_1 \xrightarrow{b} q_2 \xrightarrow{b} q_4 \}$
- Does the machine accept the string aabb ?
  Yes.
- Does the machine accept the string ϵ ?
  Yes.

1.2 Formal Descriptions

1.2.1 M_1

- Q = { q_1, q_2, q_3 }
- Σ = { a,b }
- δ =

	a	b
q_1	q_2	q_1
q_2	q_3	q_3
q_3	q_2	q_1

- $q_0 = q_1$
- F = { q_2 }

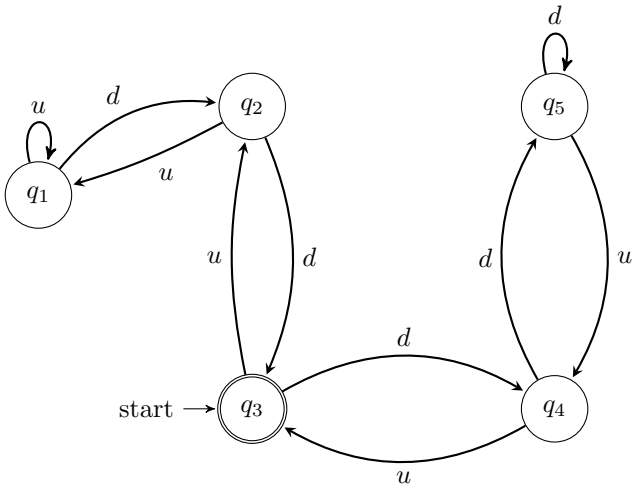
1.2.2 M_2

- Q = { q_1, q_2, q_3, q_4 }
- Σ = { a,b }
- δ =

	a	b
q_1	q_1	q_2
q_2	q_3	q_4
q_3	q_2	q_1
q_4	q_3	q_4

- $q_0 = q_1$
- F = { q_1, q_4 }

1.3 DFA Construct



2 DFA Exercise

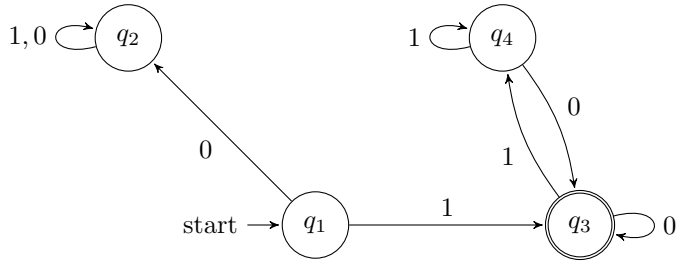
2.1

	1	2	3
f_1	x	x	x
f_2	x	x	y
f_3	x	y	x
f_4	y	x	x
f_5	x	y	y
f_6	y	y	x
f_7	y	x	y
f_8	x	y	x
f_9	y	y	y

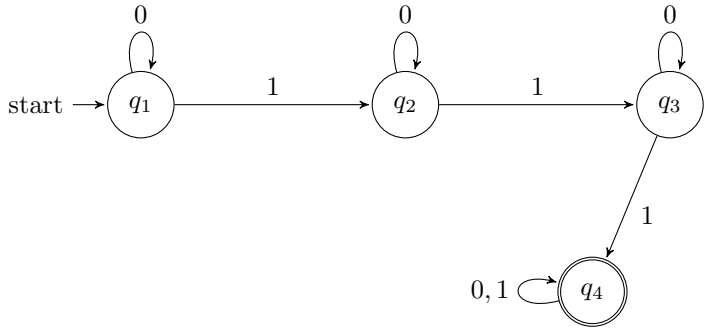
2.2

Num of states = s = 4
Size of alphabet = a = 3
$s * s^{as} * 2^s = ans$
$4 * 4^{3*4} * 2^4 = 1073741824$

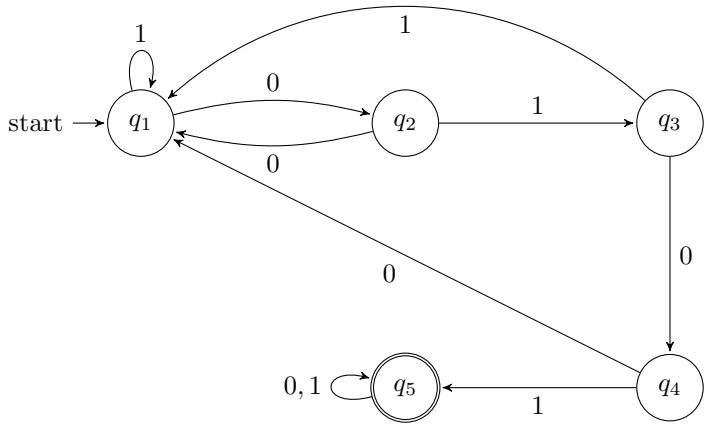
2.3


1, 0
q_2
1
q_4
0
1
0
start
q_1
1
q_3
0

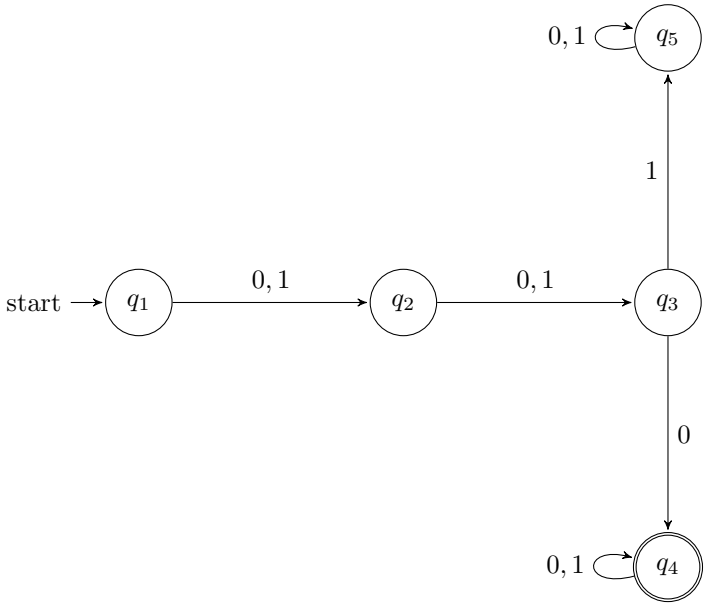
2.4


0
0
0
start
q_1
1
q_2
1
q_3
1
0, 1
q_4

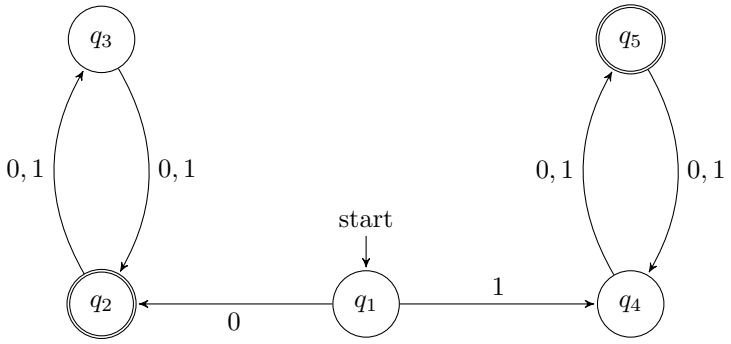
2.5


1
1
0
start
q_1
q_2
1
q_3
0
0
0
0, 1
q_5
q_4
1

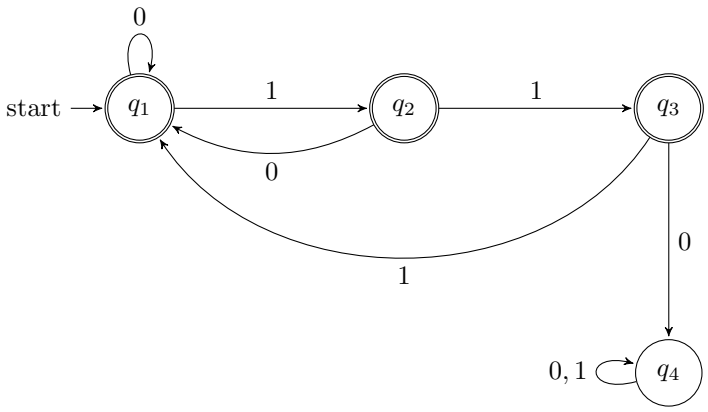
2.6


0, 1
q_5
1
start
q_1
0, 1
q_2
0, 1
q_3
0
0, 1
q_4

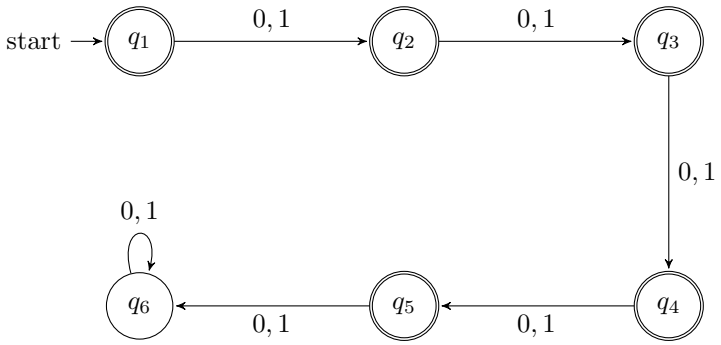
2.7


q_3
q_5
0, 1
0, 1
0, 1
0, 1
start
q_2
q_1
1
q_4
0

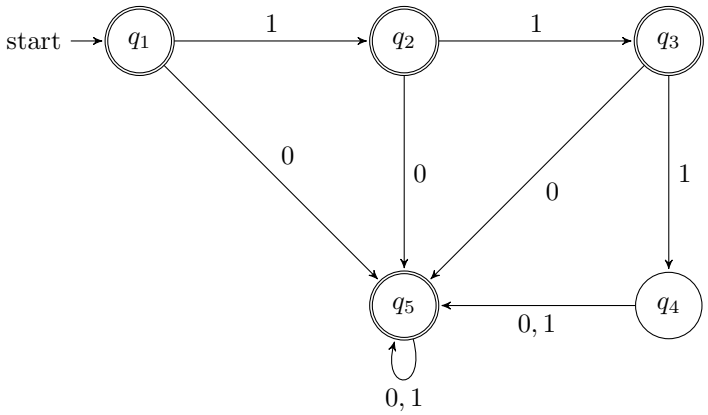
2.8


start
q_1
q_2
q_3
q_4
0
1
1
0
1
0
0, 1

2.9


start
q_1
q_2
q_3
q_4
q_5
q_6
0, 1
0, 1
0, 1
0, 1
0, 1
0, 1

2.10


start
q_1
q_2
q_3
q_4
q_5
1
1
0
0
0
1
0, 1
0, 1