Homework 2

CMPS130 Computational Models, Spring 2015

1.1

a. M_1: q_1 M_2: q_1

b. M_1: $\{q_2\}$ M_2: $\{q_1, q_4\}$

c. M_1: $q_1 \xrightarrow{\texttt{a}} q_2 \xrightarrow{\texttt{a}} q_3 \xrightarrow{\texttt{b}} q_1 \xrightarrow{\texttt{b}} q_1$ M_2: $q_1 \xrightarrow{\texttt{a}} q_1 \xrightarrow{\texttt{a}} q_1 \xrightarrow{\texttt{b}} q_2 \xrightarrow{\texttt{b}} q_4$

d. M_1: No. M_2: Yes

e. M_1: No. M_2: Yes

1.2

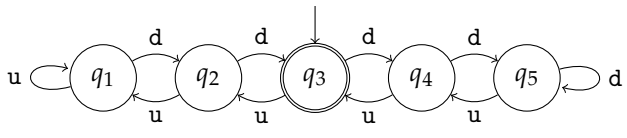
$M_1 = (\{q_1, q_2, q_3\}, \{\texttt{a}, \texttt{b}\}, \delta_1, q_1, \{q_2\})$

δ_1	a	b
q_1	q_2	q_1
q_2	q_3	q_3
q_3	q_2	q_1

$M_2 = (\{q_1, q_2, q_3\}, \{\texttt{a}, \texttt{b}\}, \delta_2, q_1, \{q_1, q_4\})$

δ_2	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

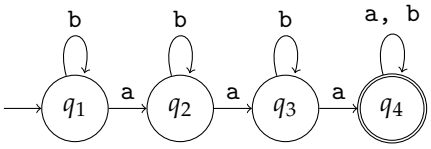
1.3



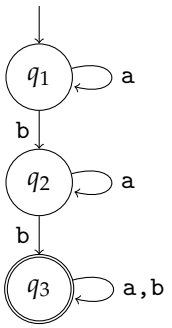
1.4

a.

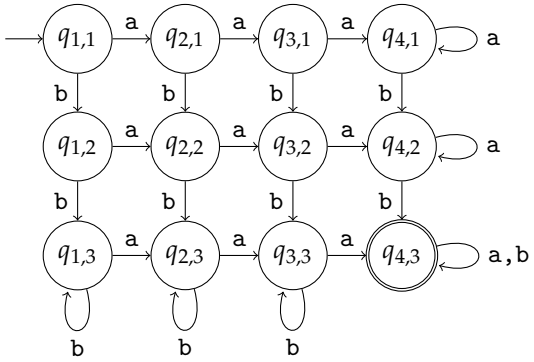
At least three a's:



At least two b's:

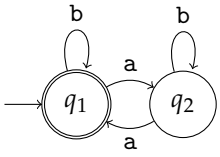


$\{w|w$ has at least three a's and at least two b's$\}$

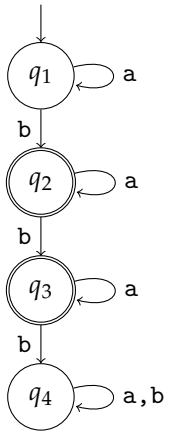


c.

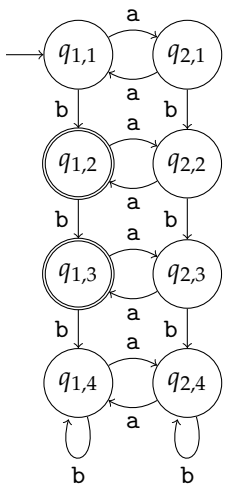
An even number of a's:



One or two b's:

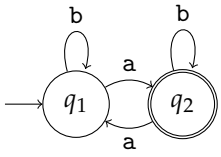


$\{w|w$ has an even number of a's and one or two b's$\}$

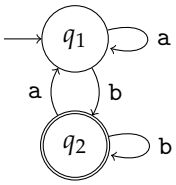


f.

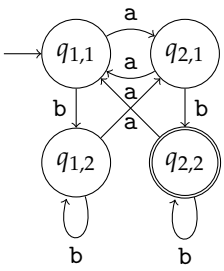
An odd number of a's:



Ends with a b:

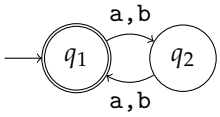


$\{w|w$ has an odd number of a's and ends with a b$\}$

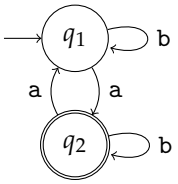


g.

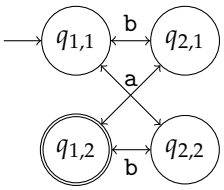
w has even length:



Odd number of a's:

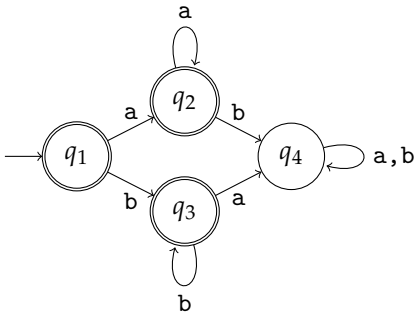


$\{w|w$ has even length and an odd number of a's$\}$

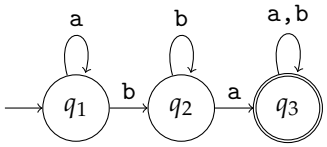


1.5

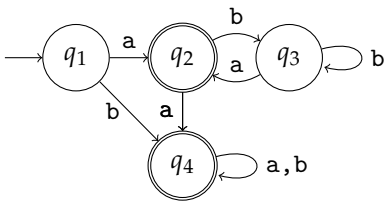
c.



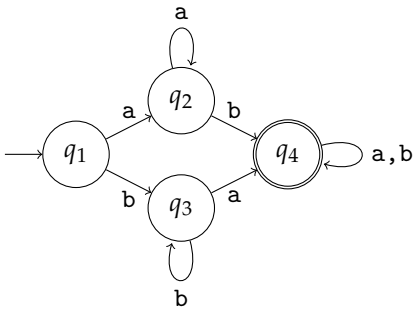
d.



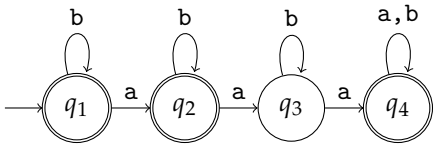
e.


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

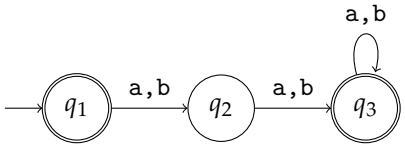
f.


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

g.

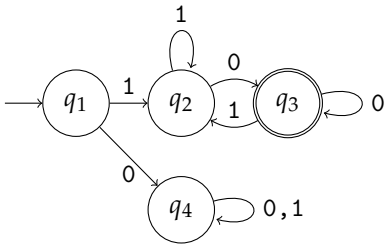

q_1
q_2
q_3
q_4
b
b
b
a,b
a
a
a

h.

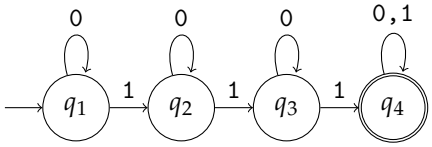

q_1
q_2
q_3
a,b
a,b
a,b

1.6

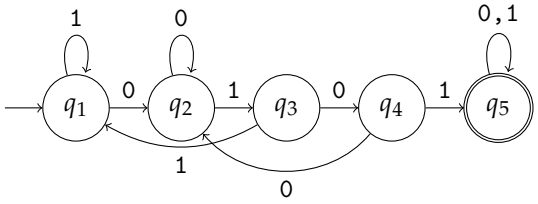
a.


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

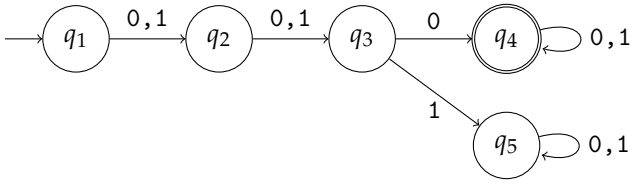
b.


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

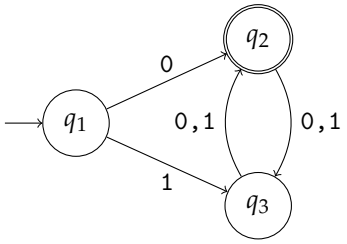
c.


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

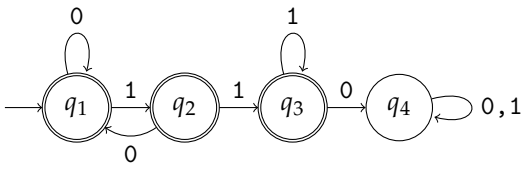
d.


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

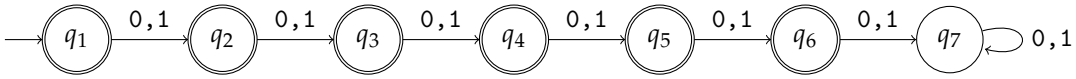
e.


q_2
0
q_1
0,1
0,1
1
q_3

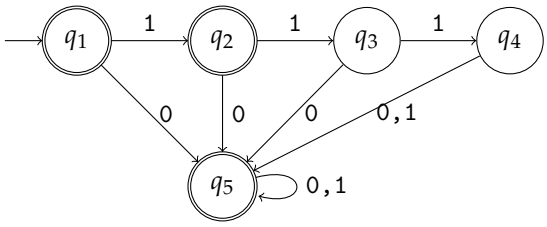
f.


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

g.


q_1
0,1
q_2
0,1
q_3
0,1
q_4
0,1
q_5
0,1
q_6
0,1
q_7
0,1

h.


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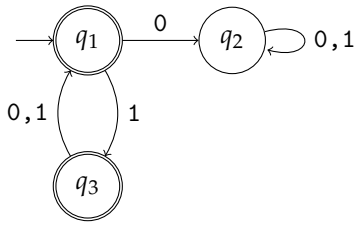
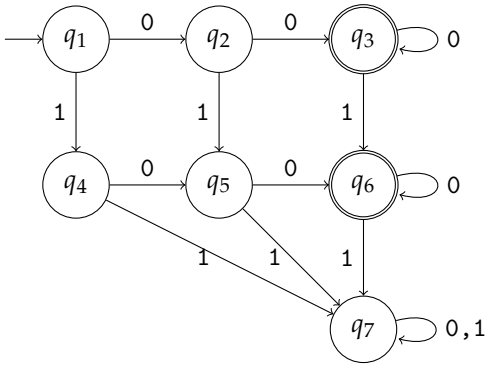
q_2
1
q_3
1
q_4
0
0
0
0,1
q_5
0,1

i.


q_1
0
q_2
0,1
0,1
1
q_3

j.


q_1
0
q_2
0
q_3
0
1
1
1
q_4
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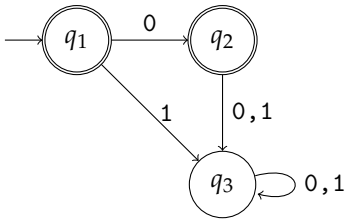
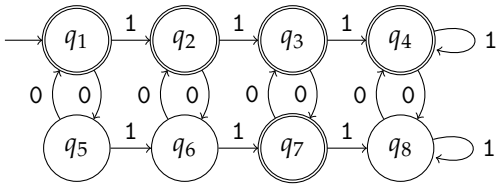
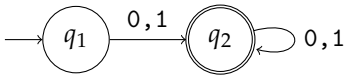
q_5
0
q_6
0
1
1
1
q_7
0,1

k.



l.



m.

n.