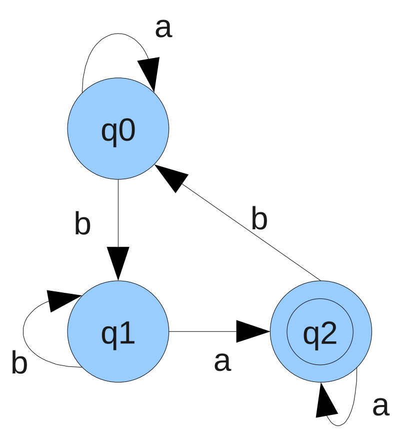
J Bolton Set 8

Languages and Machines

Chap 5 (pp 184-186): 1abcd, 12, 13, 22d, 23, 25d.

1.

(a)



(b)

[q0, abaa] ⊢ [q0, baa] ⊢ [q1, aa] ⊢ [q2, a] ⊢ [q2, **λ**] accepts	[q0, bbbabb] ⊢ [q1, bbabb] ⊢ [q1, babb] ⊢ [q1, abb] ⊢ [q2, bb] ⊢ [q0, b] ⊢ [q1, **λ**] rejects	[q0, bababa] ⊢ [q1, ababa] ⊢ [q2, baba] ⊢ [q0, aba] ⊢ [q0, ba] ⊢ [q1, a] ⊢ [q2, **λ**] accepts	[q0, bbbaa] ⊢ [q1, bbaa] ⊢ [q1, baa] ⊢ [q1, aa] ⊢ [q2, a] ⊢ [q2, **λ**] accepts

(c)

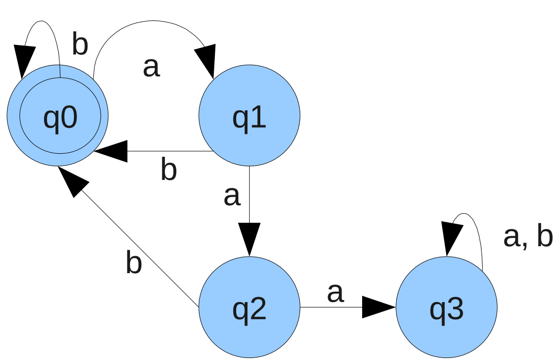
See above.

(d)

(a*b+a+)(ba*b+a+)*

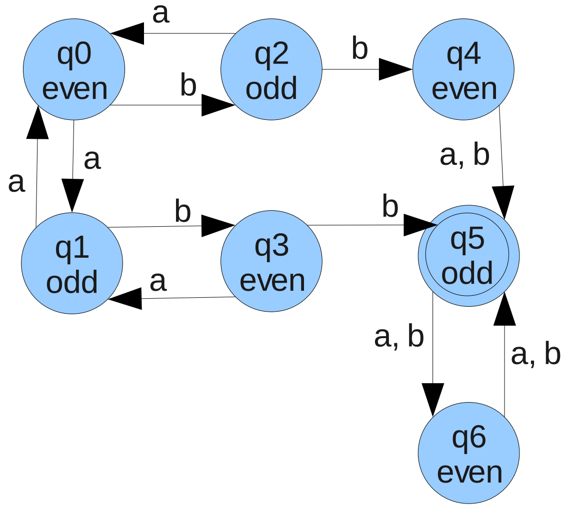
12.

Q = {q0, q1, q2, q3} Sigma = {a,b} F = {q0}



13.

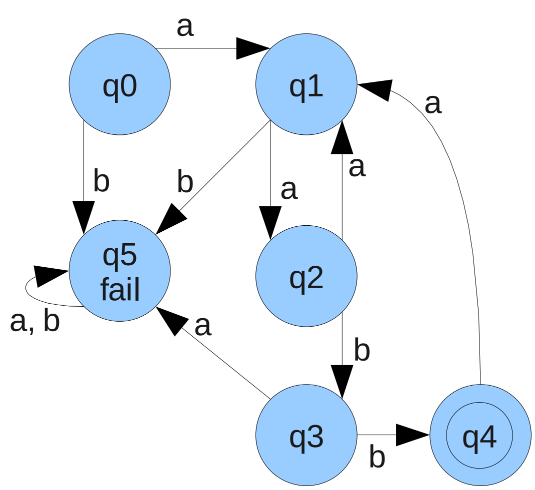
Q = {q0...q6} Sigma = {a,b} F = {q5}



22.

(d)

((aa)+bb)*
Q = {q0..q5}
Sigma = {a,b}
F = {q4}



23.

(a)

t	**a**	**b**
q0	{q0, q1}	0
q1	0	{q1, q2}
q2	{q0, q1}	0

(b)

[q0, aaabb] ⊢ [q0, aabb] ⊢ [q0, abb] ⊢ [q1, bb] ⊢ [q1, b] ⊢ [q2, lambda]

(c) Yes.

(d) (a+b+)+

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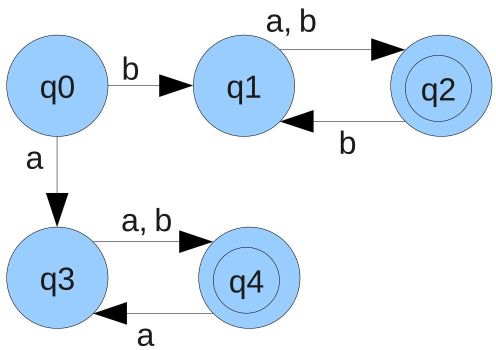
25.

(d)



Prove that for any DFA M, any two strings u and v, and any state q in M: delta-hat(q,uv) = delta-hat(delta-hat(q,u),v). Hint. Use induction on v.

<u>Basis:</u>
u = lambda, v = lambda
d^(q, lambdalambda) = d^(q, lambda) = q
d^(d^(q, u), v) = d^(d^(q, lambda), lambda) = d^(q, lambda) = q

u = lambda, v is an element of sigma and length(v) = 1
d^(q, lambdav) = d^(q, v) = d(q,v)
d^(d^(q,lambda),v) = d^(q,v) = d(q,v)
u is an element of sigma and length(u) = 1 and v = lambda
d^(q, ulambda) = d^(q, u) = d^(q,u)
d^(d^(q,u), lambda) = d^(q,u) = d(q,u)

<u>Inductive hypthesis:</u>
d^(q,uv) = d^(d^(q,u),v) for all for all strings where the length of v is less or equal to n.

<u>Induction:</u>
if v is length n+1, we can call it wa where length(a) = 1. Thus:
d^(q, uwa) = d(d^(q, uw), a) = d(d^(d^(q, u), w) a)

d^(q, uwa)
=
d(d^(q, uw), a) [def. 5.2.4]
=
d(d^(d^(q, u), w), a) [Inductive hypothesis]

d^(d^(q, u), wa)
=
d(d^(d^(q,u), w), a) [def. 5.2.4]