1.1.1

Show $|2^n|=2^{|n|}$

As the set is an empty set φ. There is only one element in the set.

$|2^s|=1=2^{|s|}$

As |S|=1, the set is an element.

$|2^1|=2=2^{|1|}$

Assume |S|≦n, $|2^n|=2^{|n|}$ is true

Then, as |S|=n+1

It has two case: pre n items including (n+1)th item or not.

S={a1,a2,⋯,a_n}

(1)S'=S∪{a_{n+1}}, |S'|=n+1 (2)S'=S, |S'|=n

So we can get $|2^{n+1}|=2*2^{|n|}=2^{|n|+1}=2^{|n+1|}$

By induction, we prove it.

1.2.1

As n=0, $|u^0|=|\lambda|=0=0|u|$

As n=1, $|u^1|=|u|=1*|u|$

Assume n≦k, $|u^k|=k|u|$ is true

Then, as n=k+1

We already know |u・v|=|u|+|v|

$|u^{k+1}|=|u^k\cdot u|=|u^k|+|u|=k|u|+|u|=(k+1)|u|$

By induction, we prove it.

1.3.4

<id>-><letter><rest>

<rest>-><letter><rest>|<digit><rest1>

<rest1>-><letter><rest1>|<digit><rest2>| λ

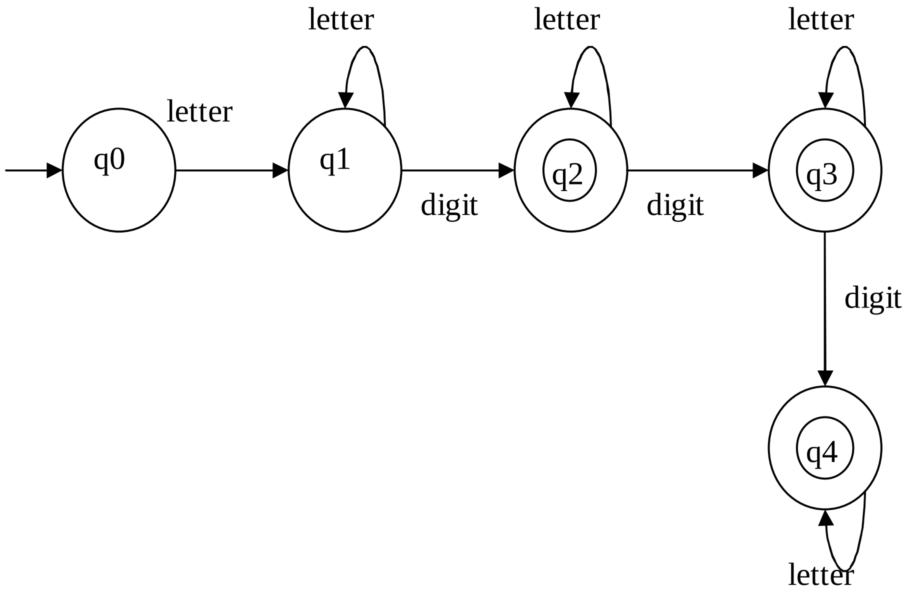
<rest2>-><letter><rest2>|<digit><rest3>| λ

<rest3>-><letter><rest3>| λ

<letter>->a|b|c|⋯|z|A|B|C⋯|Z

<digit>->0|1|2|⋯|9

And an accepter.



From accepter, we can see

<id>->letterLdigitL|letterLdigitLdigit|letterLdigitLdigitLdigitL

L->letterL| λ

2.1.1

0001 and 01001 are accepted.

2.2.1

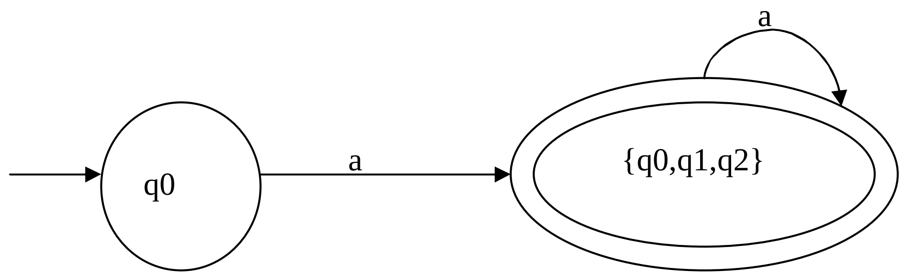
|w| has (|w|+1) interval at most. Every interval has Λ at most.

We get (|w|+1)Λ.

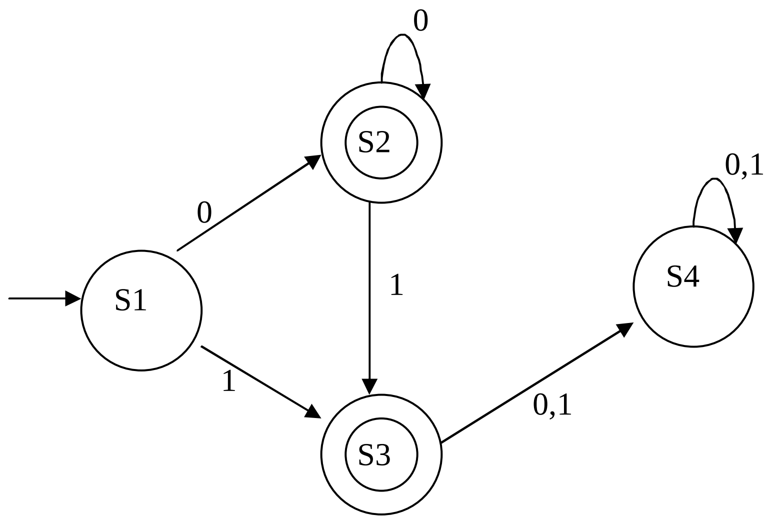
The number of walk is |w|.

Total is (|w|+1)Λ+|w|=Λ+(Λ+1)|w|

2.3.1



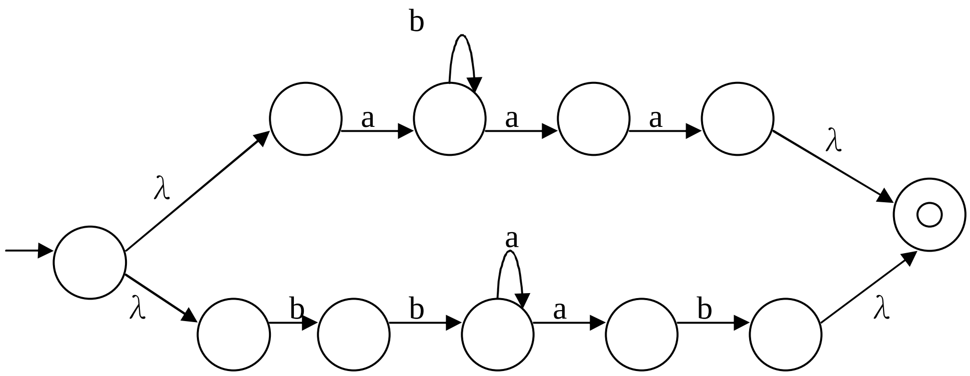
2.4.1



S1={q0}
S2={q0,q1}{q0,q1,q2}
S3={q1}{q1,q2}
S4={q2} ϕ

3.1.1
b, ab, bb, ba, abb, aba, bba, bab, aab, bbb, baa

3.2.1



3.3.1