Automata

Course Work 1.3
F29LP

Submitted by

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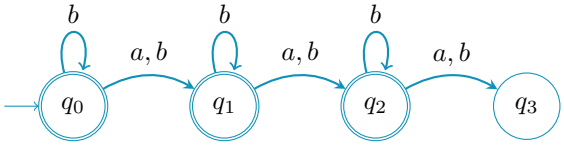
1 $/(ab)*/$

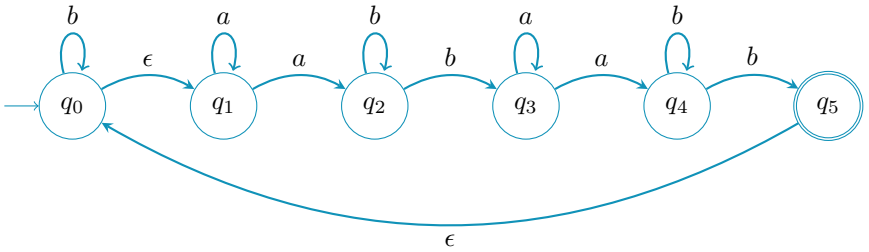
2 $/(b*a)+a+b[ab]*/$

3 NFA

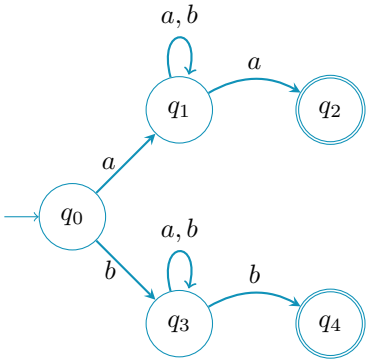
1. $L = \{w \in \{a,b\}* | \text{w contains at most two a's}\}$



2. $L = \{w \in \{a,b\}* | \text{w contains an even number of occurrences of ab as a subword}\}$



3. $L = \{w \in \{a,b\}* | \text{the first and the last letter of w are identical}\}$



4 $/a * (ba\{2,\})*/$

5

$$S \to aA$$
$$A \to aB$$
$$B \to aS|aC$$
$$C \to aS|\epsilon$$

6 Unmarked, N/A

7

1.

$$S \to aA|bB$$
$$A \to aA|bS|aB|\epsilon$$
$$B \to aS$$

2. Is ambiguous as "aaaa" can be constructed in two ways

(I)

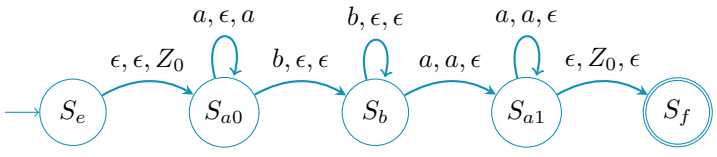
Rule	Result
$S \to aA$	a
$A \to aA$	aa
$A \to aA$	aaa
$A \to aA$	aaaa
$A \to \epsilon$	$\underline{aaaa}$

(II)

Rule	Result
$S \to aA$	a
$A \to aB$	aa
$B \to aS$	aaa
$S \to aA$	aaaa
$A \to \epsilon$	$\underline{aaaa}$

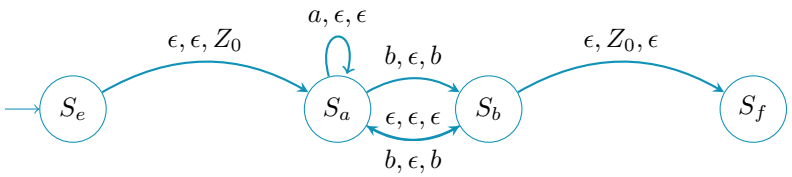
8 The CFG is used to create a number of a's with an equivalent number of b's, in any order.

9 $L = \{a^m b^n a^m | m, n \geq 0\}$, alphabet $= \{a, b, Z_0\}$, Start stack symbol $= Z_0$

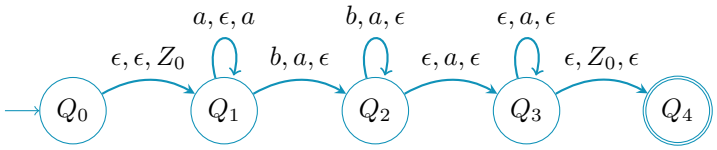


10 **Not possible as DFA express regular languages, and $a^m b^n a^m$ is a only expressible as a context-free language.**

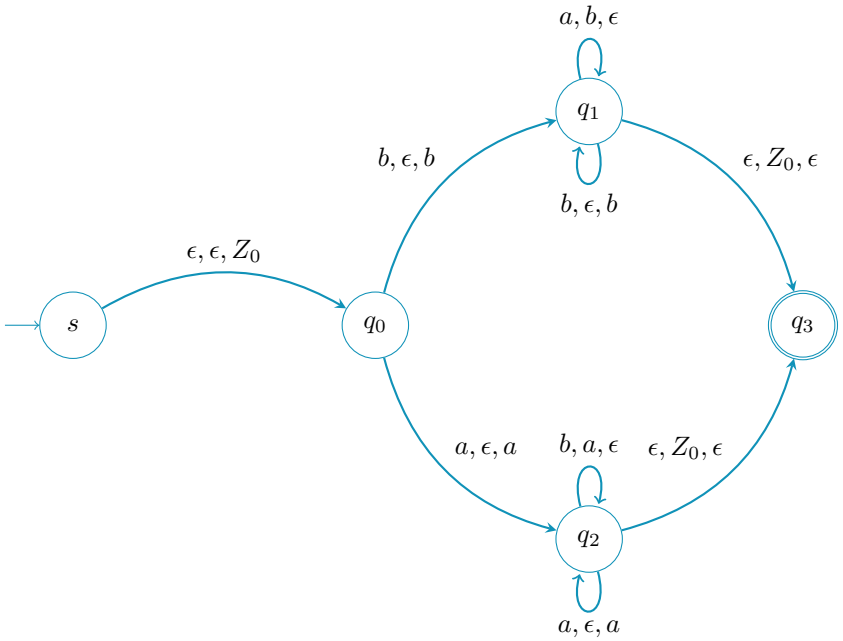
11 **L=**$\{a^m b^{2n} | m, n \geq 0\}$



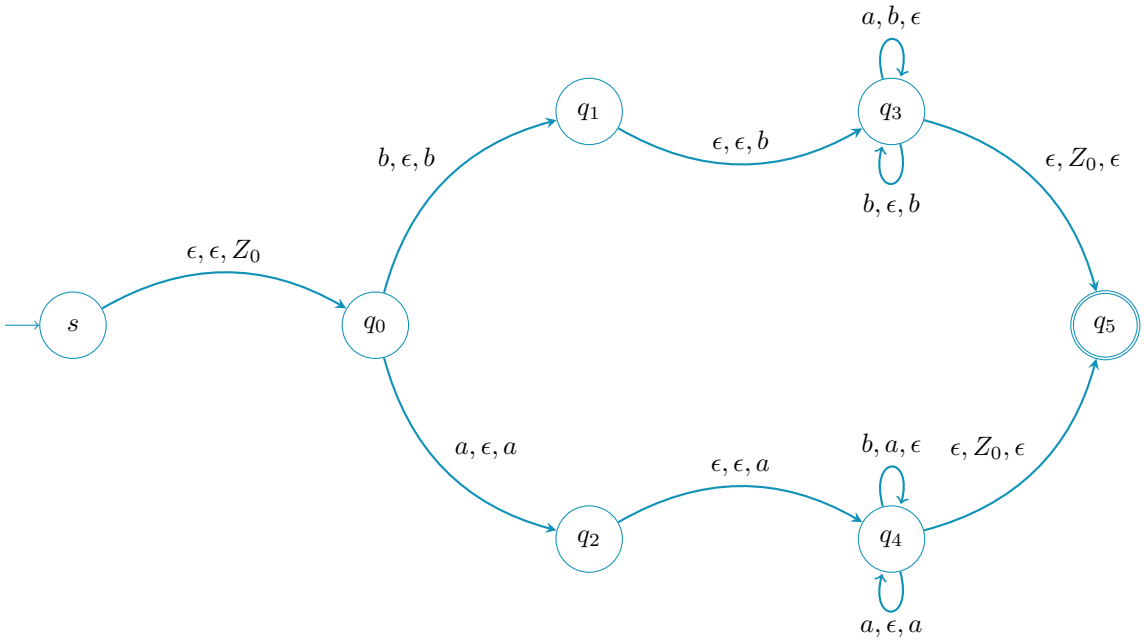
12 **L=**$\{a^m b^n | m > n > 0\}$



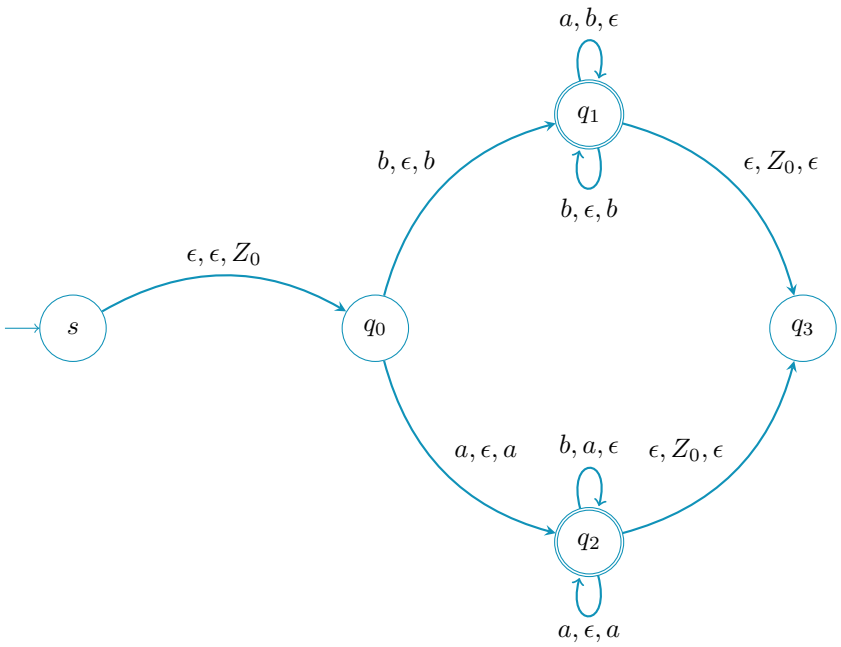
13 $L = \{W | \#_a W = \#_b W\}$


a, b, ϵ
q_1
b, ϵ, b
ϵ, Z_0, ϵ
b, ϵ, b
ϵ, ϵ, Z_0
s
q_0
q_3
a, ϵ, a
b, a, ϵ
ϵ, Z_0, ϵ
q_2
a, ϵ, a

14 **L**=$\{W|\#_aW = 2\#_bW\}$


a, b, ϵ
q_1
q_3
b, ϵ, b
ϵ, ϵ, b
ϵ, Z_0, ϵ
b, ϵ, b
ϵ, ϵ, Z_0
s
q_0
q_5
a, ϵ, a
b, a, ϵ
ϵ, ϵ, a
ϵ, Z_0, ϵ
q_2
q_4
a, ϵ, a

15


a, b, ϵ
q_1
b, ϵ, b
ϵ, Z_0, ϵ
b, ϵ, b
ϵ, ϵ, Z_0
s
q_0
q_3
a, ϵ, a
b, a, ϵ
ϵ, Z_0, ϵ
q_2
a, ϵ, a