

Λ

a b

a a b b

a a a b b b

PUSH DOWN AUTOMATA

$$L = \{a^n b^n \mid n \geq 0\}$$

Rec →

Rec →

Move Number	State	Input	Stack Symbol	Move(s)
1	q_0	a	Z_0	$\checkmark (q_1, aZ_0)$
2	q_1	a	a	(q_1, aa)
3	q_1	b	a	
4	q_2	b	a	(q_2, Λ)
5	q_2	Λ	Z_0	(q_3, Z_0)
(all other combinations)				none

$(q_0, aabb, z_0)$

①

(q_1, abb, az_0)

②

$(q_1, bb, aa z_0)$

③

$(q_2, b, a z_0)$

④

(q_2, \wedge, z_0) ⑤ (q_3, z_0) Accepted

(q_0, \wedge, z_0)

Accepted

PUSH DOWN AUTOMATA

$L = \{x \text{ belongs to } \{a,b\}^* \mid x \text{ is an Odd Length Palindrome}\}$

a \rightarrow Ignore
a a a

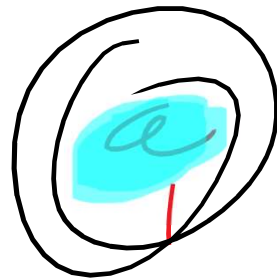
a b a b a

b a b

a a a a a

b a a a b

b b a b b



Ignore



PUSH DOWN AUTOMATA

$L = \{x \text{ belongs to } \{a,b\}^* \mid x \text{ is an Odd Length Palindrome}\}$

①	q_0	a	z_0	(q_0, az_0)	(q_1, z_0)
②	z_0	b	z_0	(q_0, bz_0)	(q_1, z_0)
③	q_0	a	a	(q_0, aa)	(q_1, a)
④	q_0	a	b	(q_0, ab)	(q_1, b)
⑤	q_0	b	b	(q_0, bb)	(q_1, b)
⑥	q_0	b	a	(q_0, ba)	(q_1, a)
⑦	q_1	a	a	(q_1, Λ)	
⑧	q_1	b	b	(q_1, Λ)	

PUSH DOWN AUTOMATA

$L = \{x \text{ belongs to } \{a,b\}^* \mid x \text{ is an Odd Length Palindrome}\}$

⑨ q_1 \wedge z_0 (q_2, z_0)

(q_0, aaa, z_0)

push

I_j

(q_1, aa, z_0)

⑨

(q_2, aa, z_0)

X

(q_0, aa, az_0)

$(q_0, a, aaaz_0)$

(q_1, a, az_0)

PUSH DOWN AUTOMATA

$L = \{x \text{ belongs to } \{a,b\}^* \mid x \text{ is an Odd Length Palindrome}\}$

(q_0, a, aqz_0)

(q_1, a, aqz_0)

(q_1, \wedge, qz_0)

(q_2, qz_0) -
Accepted

(q_0, \wedge, aqz_0)

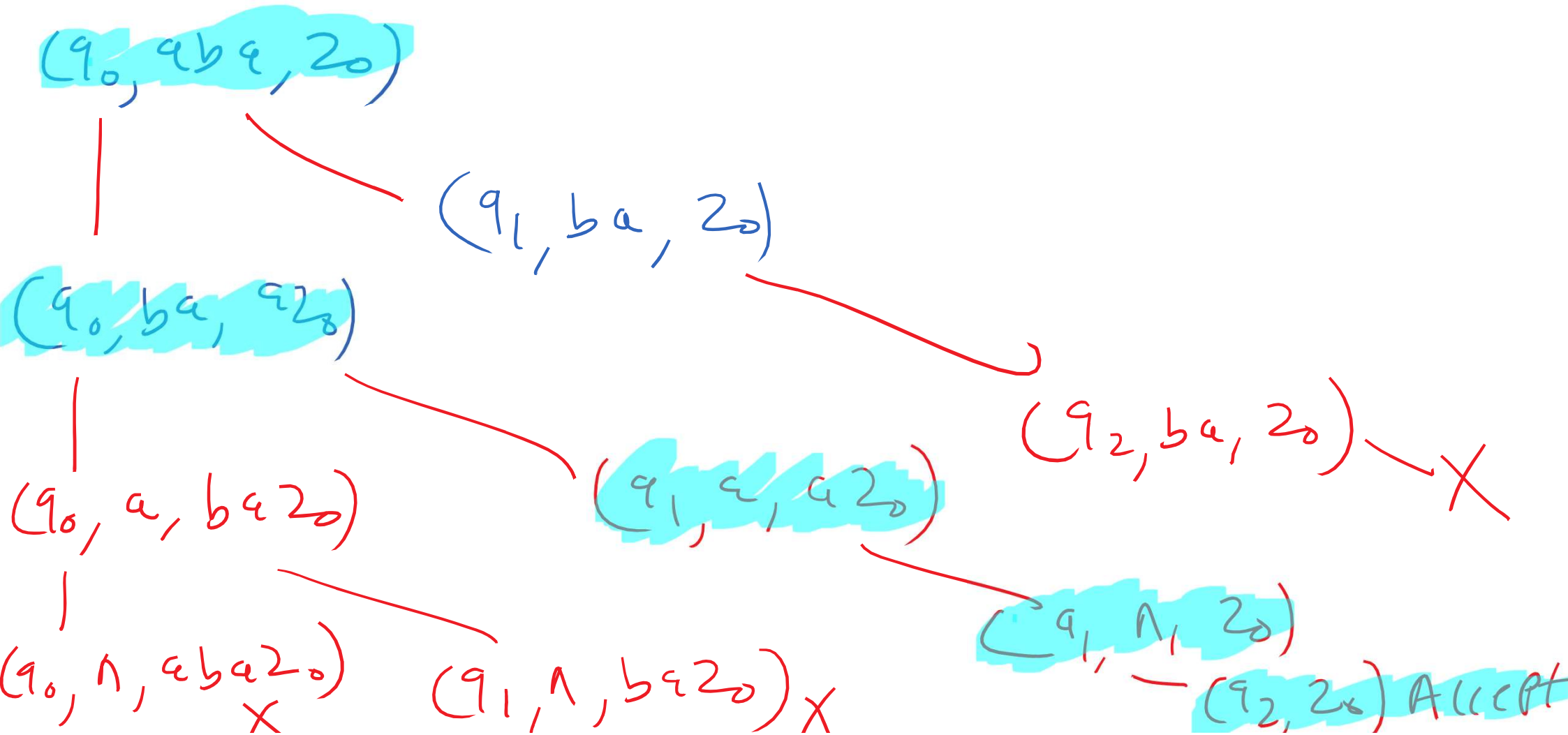
X

(q_1, \wedge, aqz_0)

X

PUSH DOWN AUTOMATA

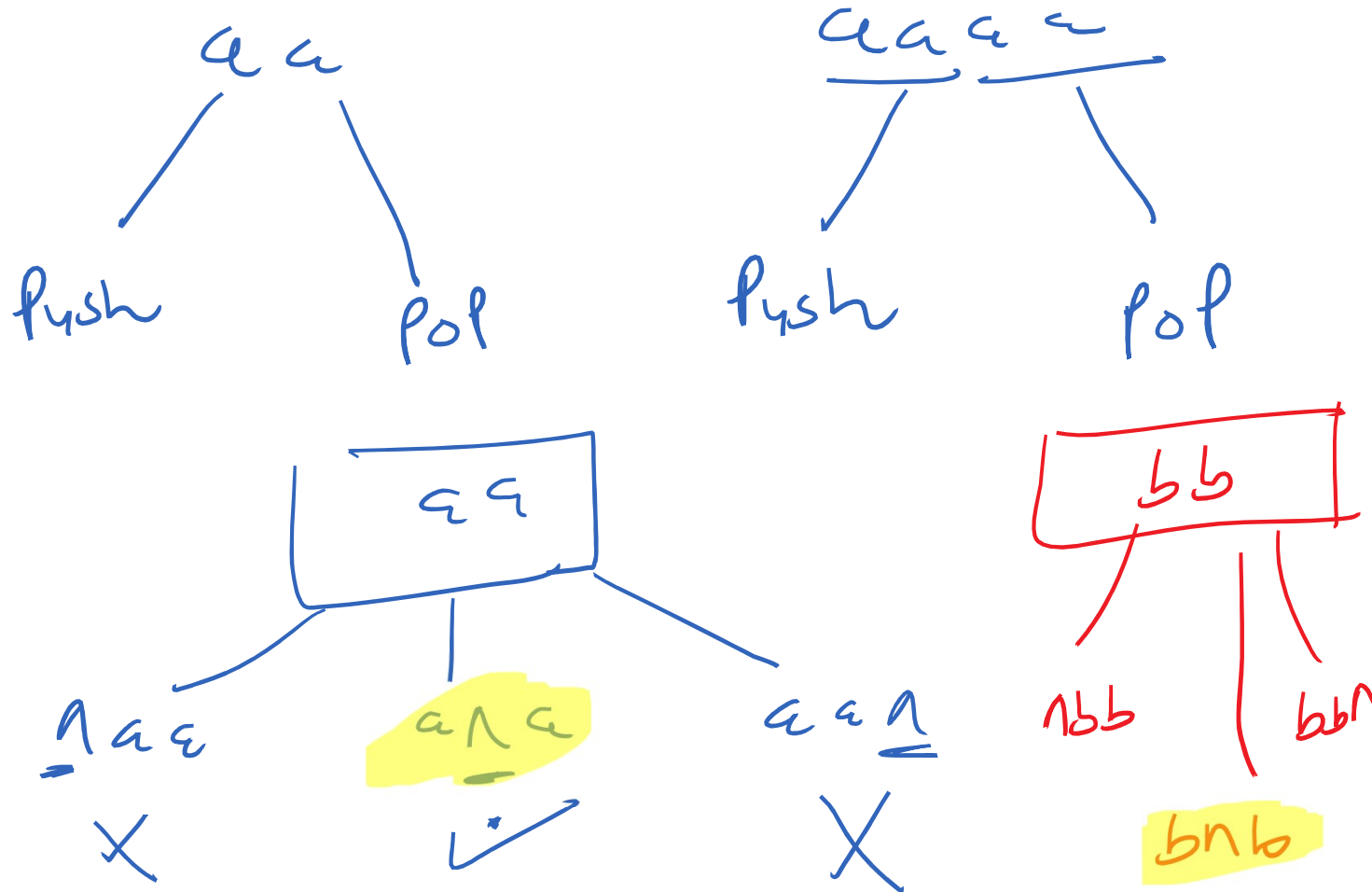
$L = \{x \text{ belongs to } \{a,b\}^* \mid x \text{ is an Odd Length Palindrome}\}$



PUSH DOWN AUTOMATA

$L = \{x \text{ belongs to } \{a,b\}^* \mid x \text{ is an } \underline{\underline{\text{Even Length Palindrome}}}\}$

Λ
aa
bb
abba
baab
aaaa
bbbb



PUSH DOWN AUTOMATA

$L = \{x \text{ belongs to } \{a,b\}^* \mid x \text{ is an Even Length Palindrome}\}$

①	q_0	a	z_0	$(q_0, a z_0)$ — Push
②	q_0	^	z_0	(q_1, z_0) — Ignore
③	q_0	b	z_0	$(q_0, b z_0)$
④	q_0	a	a	$(q_0, a a)$
⑤	q_0	a	b	$(q_0, a b)$
⑥	z_0	b	a	$(q_0, b a)$
⑦	q_0	b	b	$(q_0, b b)$

Push

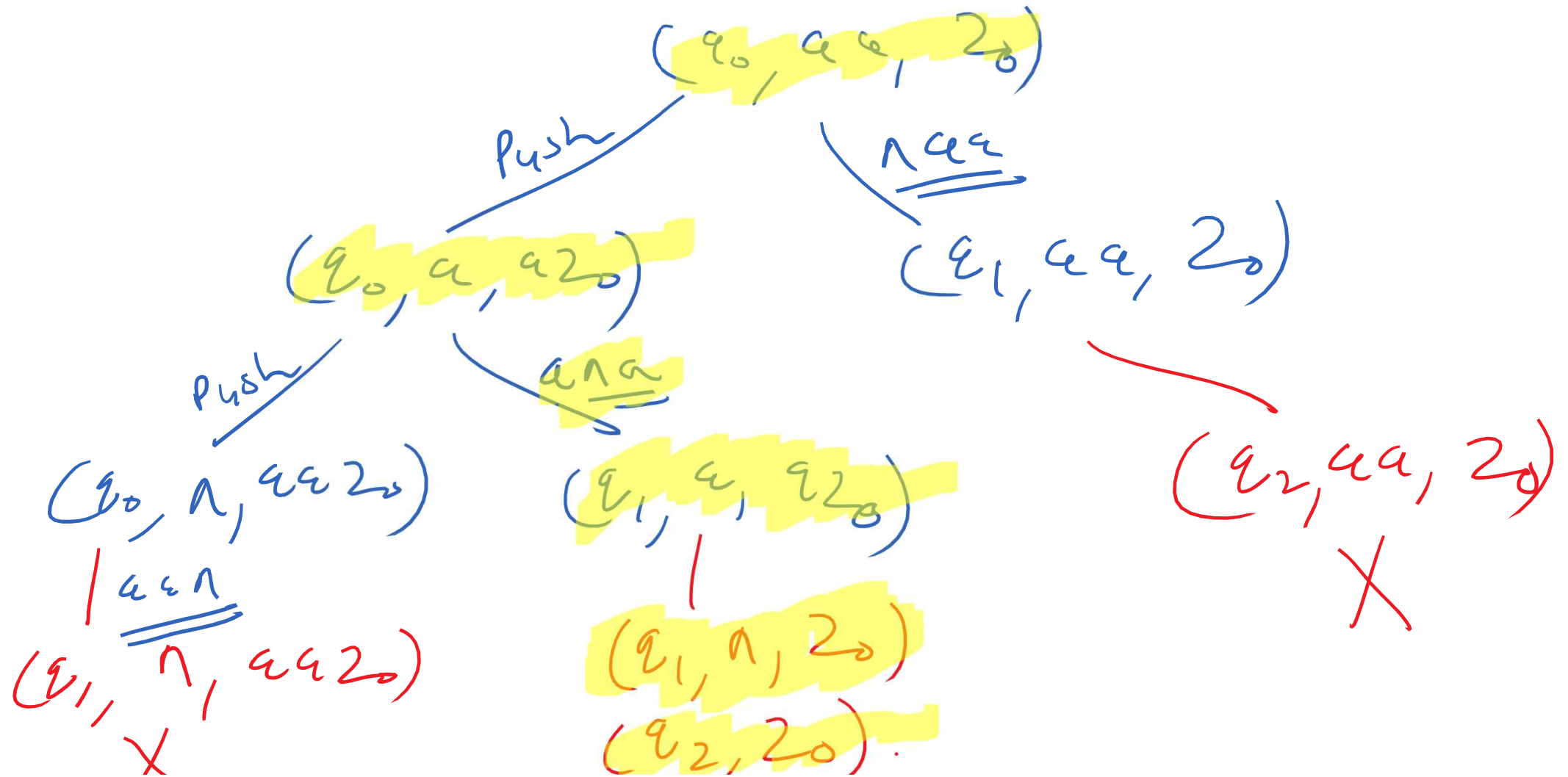
PUSH DOWN AUTOMATA

$L = \{x \text{ belongs to } \{a,b\}^* \mid x \text{ is an Even Length Palindrome}\}$

8	q_0	\wedge	a	(q_1, a)	} Ignore
9	q_0	\wedge	b	(q_1, b)	
10	q_1	a	a	(q_1, \wedge)	} - Pop
11	q_1	b	b	(q_1, \wedge)	
12	q_1	\wedge	z_0	(q_2, z_0)	- Acceptance

PUSH DOWN AUTOMATA

$L = \{x \text{ belongs to } \{a,b\}^* \mid x \text{ is an Even Length Palindrome}\}$



PUSH DOWN AUTOMATA

$L = \{x \text{ belongs to } \{a,b\}^* \mid x \text{ is a Palindrome}\}$

Move Number	State	Input	Stack Symbol	Move(s)
1	q_0	a	Z_0	$(q_0, aZ_0), (q_1, Z_0)$
2	q_0	a	a	$(q_0, aa), (q_1, a)$
3	q_0	a	b	$(q_0, ab), (q_1, b)$
4	q_0	b	Z_0	$(q_0, bZ_0), (q_1, Z_0)$
5	q_0	b	a	$(q_0, ba), (q_1, a)$
6	q_0	b	b	$(q_0, bb), (q_1, b)$
7	q_0	Λ	Z_0	(q_1, Z_0)
8	q_0	Λ	a	(q_1, a)
9	q_0	Λ	b	(q_1, b)
10	q_1	a	a	(q_1, Λ)
11	q_1	b	b	(q_1, Λ)
12	q_1	Λ	Z_0	(q_2, Z_0)
	(all other combinations)			none

even

Pop

Acceptance

PUSH DOWN AUTOMATA

