Exercise 1 [2 pts]

1- What is the pumping lemma?

it's lemma
use it to prove language
it's not regular

More details!!

2- How the pumping Lemma is used to prove that a language is non regular?

by contradiction

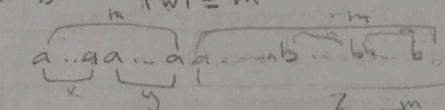
More details!! -1

Exercise 2 [2 pt]

Prove that the following language is non-regular

$$L=\{a^n b^{2n}\}$$

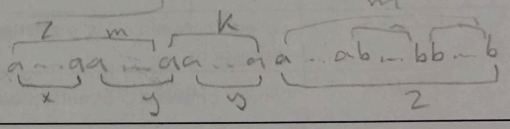
1- assume L is Regular
2- let m be critical length of L
3- pick $w = a^m b^{2m}$ $|w| \geq m$
4- $w = xyz$



5- $w' = xy^2z$

$y = a^k$ $1 \leq k \leq m$

$w = a^{m+k} b^{2m} \notin L$

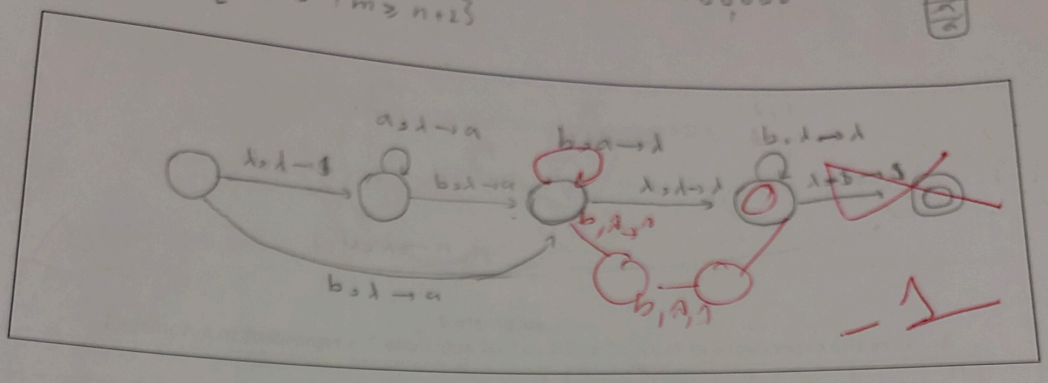


6- L is not regular by contradiction

Exercise 3 [2 pts]

Construct pushdown automata to accept the following Language

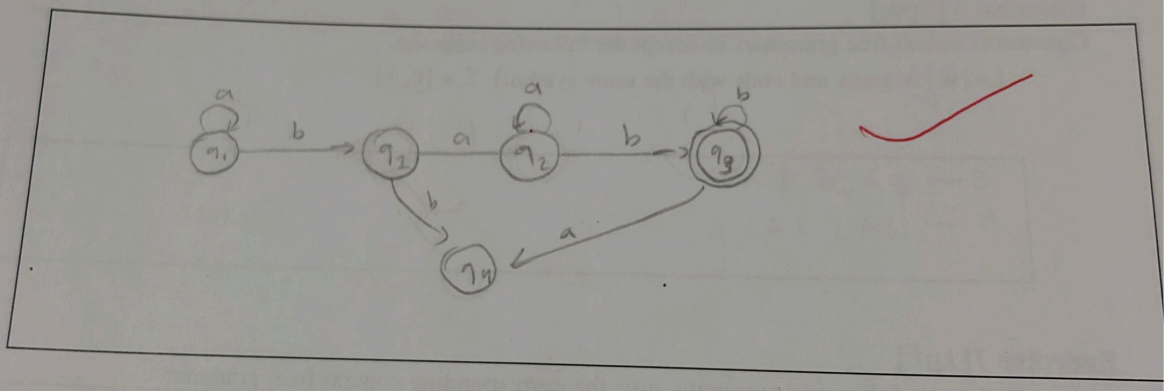
$$L = \{a^n b^m : m \geq n + 2\}$$



Exercise 4 [2 pt]

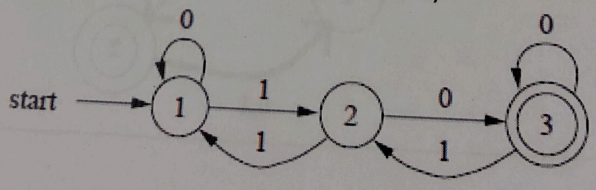
Construct a **DFA** for the following regular expression

a·ba·ab·b

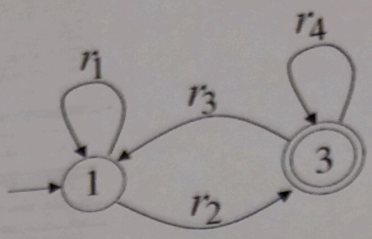


Exercise 5 [2 pts]

Given the following two automata (automata 1 and automata 2)



automata 1



automata 2

1- Give the expressions of r1,r2 ,r3 and 4 so that automata 2 is equivalent to automata 1

r1	0^*11
r2	10
r3	11
r4	00^*1

0 +11

0 +10

Exercise 6 [2pts]

Construct context free grammars to accept the following language.

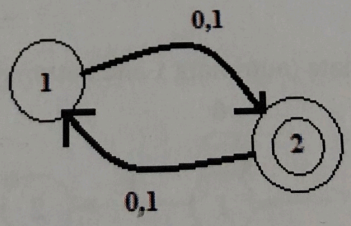
L={w | w starts and ends with the same symbol} Σ = {0, 1}

$S \rightarrow 0A0 \mid 1A1$

$A \rightarrow 0A \mid 1A \mid \lambda$

Exercise 7[1pt]

Given the following automata, give the corresponding context free grammar



$S \rightarrow 0A \mid 1A$

$A \rightarrow 0A1 \mid 0A0 \mid 1A0 \mid 1A1 \mid \lambda$

Exercise 8 [2pts]

Given the following grammar, construct the correponding PDA

$S \rightarrow aSc \mid B$

$B \rightarrow bBc \mid \lambda$

$L(G) = \{ a^n b^m c^k \mid k = n+m \}$