Give CFG $L = \{ ww \mid w \in (a+b)^* \}$

$\Rightarrow$ $w = ab$ ✓

$ww = abab$ ✓

$www = ababab$ ✗

abbabb ✗

aabb ✓

$\epsilon \Rightarrow \epsilon \cdot \epsilon$ ✗

a ✓

b ✓

aba ✓

bab ✓

aaa ✓

1 ✓

3 ✓

5 ✓

7 ✓

⋮

odd length

ababba ✓

abbabba ✓

abbabb ✗

Give CFG $L = \{ a^i b^j c^k \mid j = i + k,\ i, j, k \geq 1 \}$

aaa bbbbb cc, abbc

aa bbbbb ccc, - - - - . .

$a^n b^n b^m c^m \Longrightarrow a^n b^{n+m} c^m$

$S \rightarrow AB$

$A \rightarrow aAb \mid ab \Longrightarrow a^n b^n \mid n \geq 1$

$B \rightarrow bBc \mid bc \Longrightarrow b^m c^m \mid m \geq 1$

Give CFG $L = \{ a^i b^j c^k \mid i \neq j \text{ (or) } j \neq k \}$

$i, j, k \geq 1$

(1) $i < j$

(2) $i > j$

(3) $j < k$

(4) $j > k$

$S \rightarrow \underline{A}DC \;(1) \mid E\underline{A}C \;(2) \mid E\underline{B}C \;(3) \mid ED\underline{B} \;(4)$

$E \rightarrow aE \mid a \Longrightarrow a^n \mid n \geq 1$

$D \rightarrow bD \mid b \Longrightarrow b^n \mid n \geq 1$

$C \rightarrow cC \mid c \Longrightarrow c^n \mid n \geq 1$

$A \rightarrow aAb \mid ab \Longrightarrow a^n b^n \mid n \geq 1$

$B \rightarrow bBc \mid bc \Longrightarrow b^n c^n \mid n \geq 1$

1-stack

(or)

$a^i b^j c^k \mid i = j \;\&\&\; j = k$

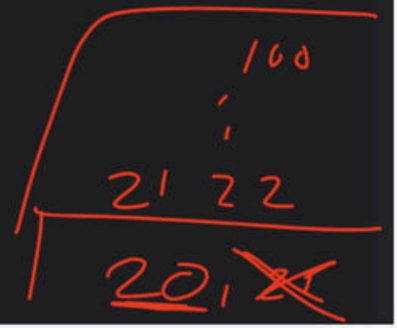
2-stacks

~~1-stack~~

8882089903

Thank you

Dedicate, Follow,



$S \rightarrow C \mid AB \mid BA$

$C \rightarrow LLC \mid L \Longrightarrow$ all odd length

$B \rightarrow LBL \mid b \Longrightarrow$ odd length mid-b

$A \rightarrow LAL \mid a \Longrightarrow$ " " " -a

e+e=e
o+o=e

$L \rightarrow a \mid b$

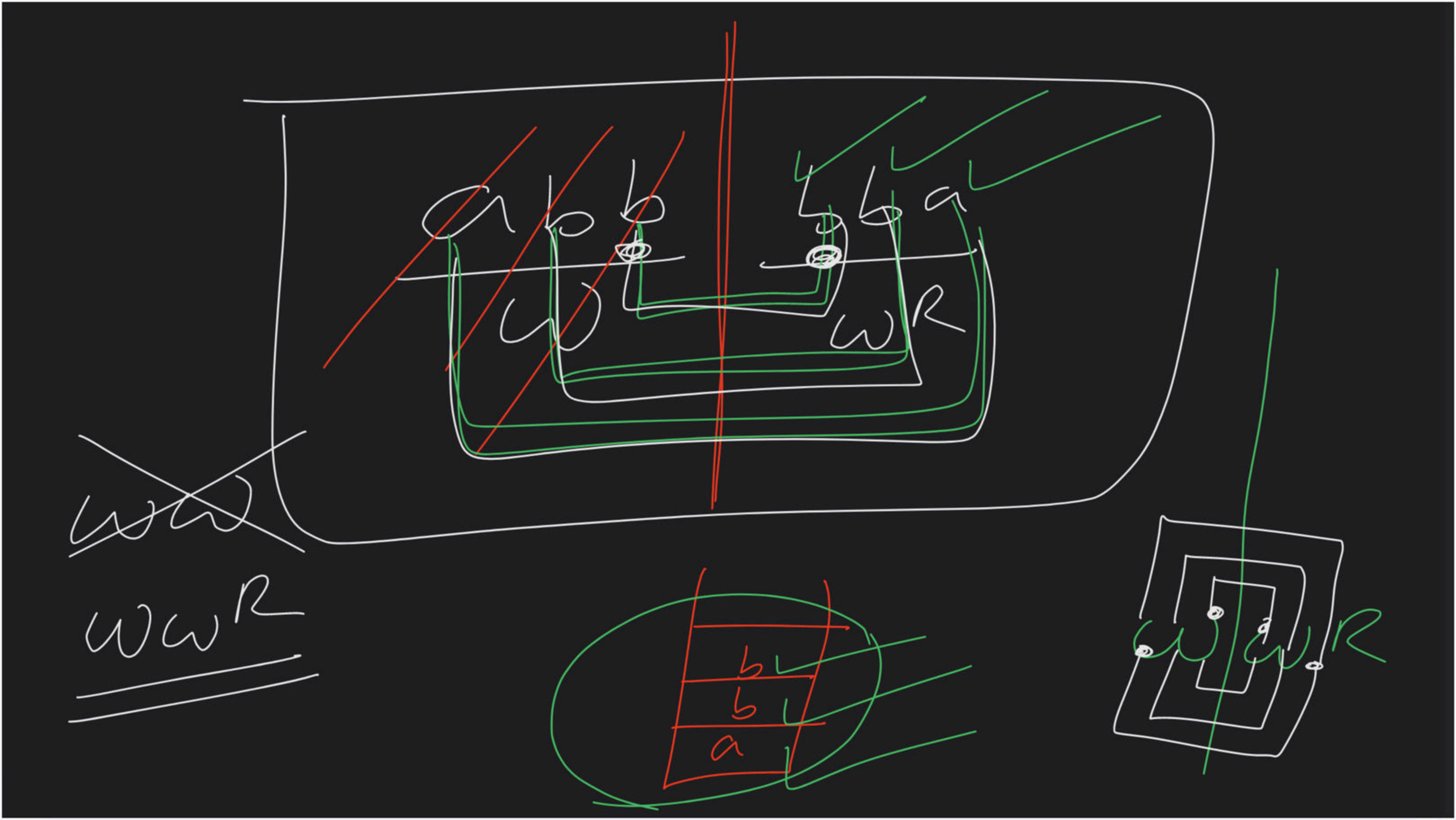
$\overline{WW} \Longrightarrow$ CFG $\Longrightarrow$ PDA

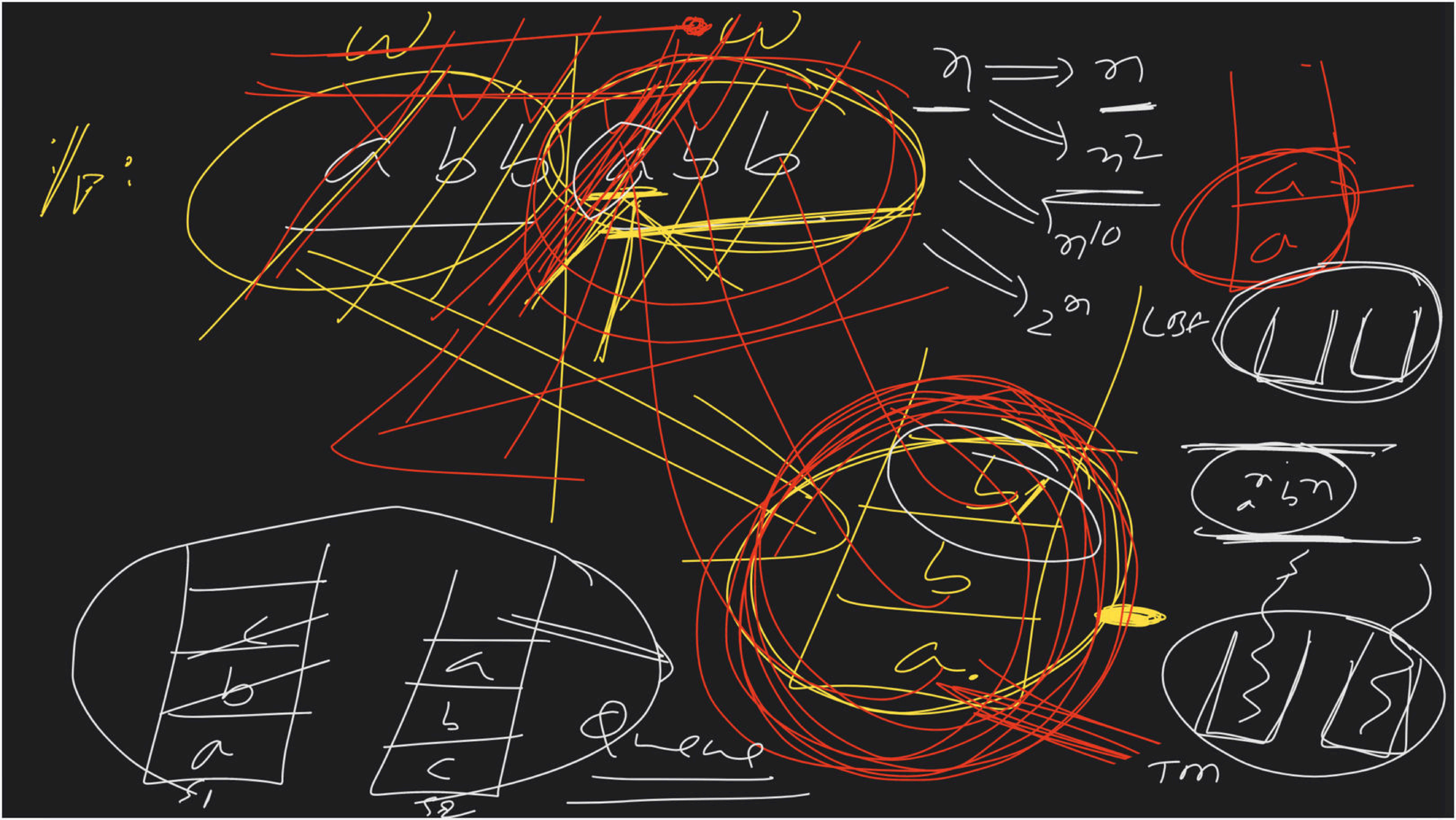
abb | baa

$\overline{WW}$ is CFL bec2 CFG PDA is

but WW is not CFL (It is CSL)

So CFL's are not closed under complement


WR
WWR
WWR


i/p :
w w
a b b a b b
n ⟹ n
n2
n/10
2n
LBA
an bn
Queue
S1
TM