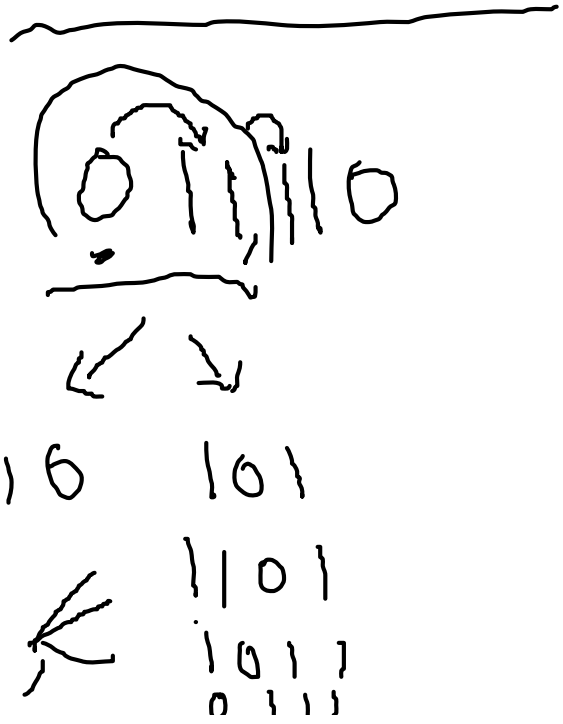
1 The power of PDA ~ CFG

$0^n 1^m \quad n > m$

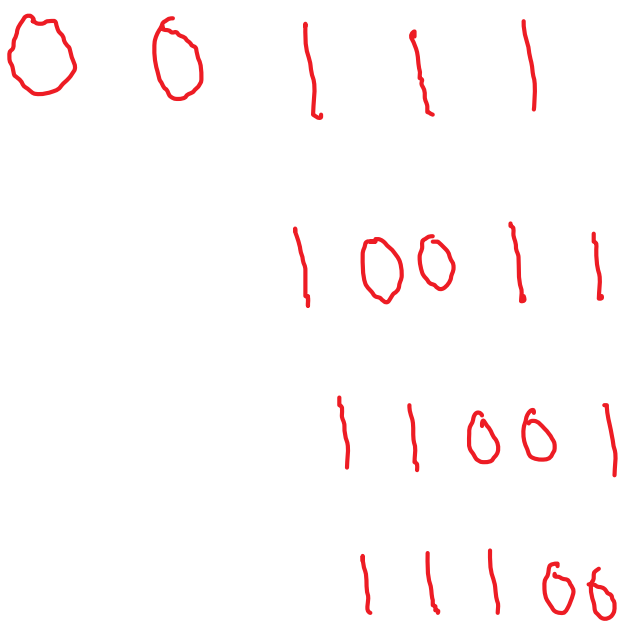
$n \geq m$

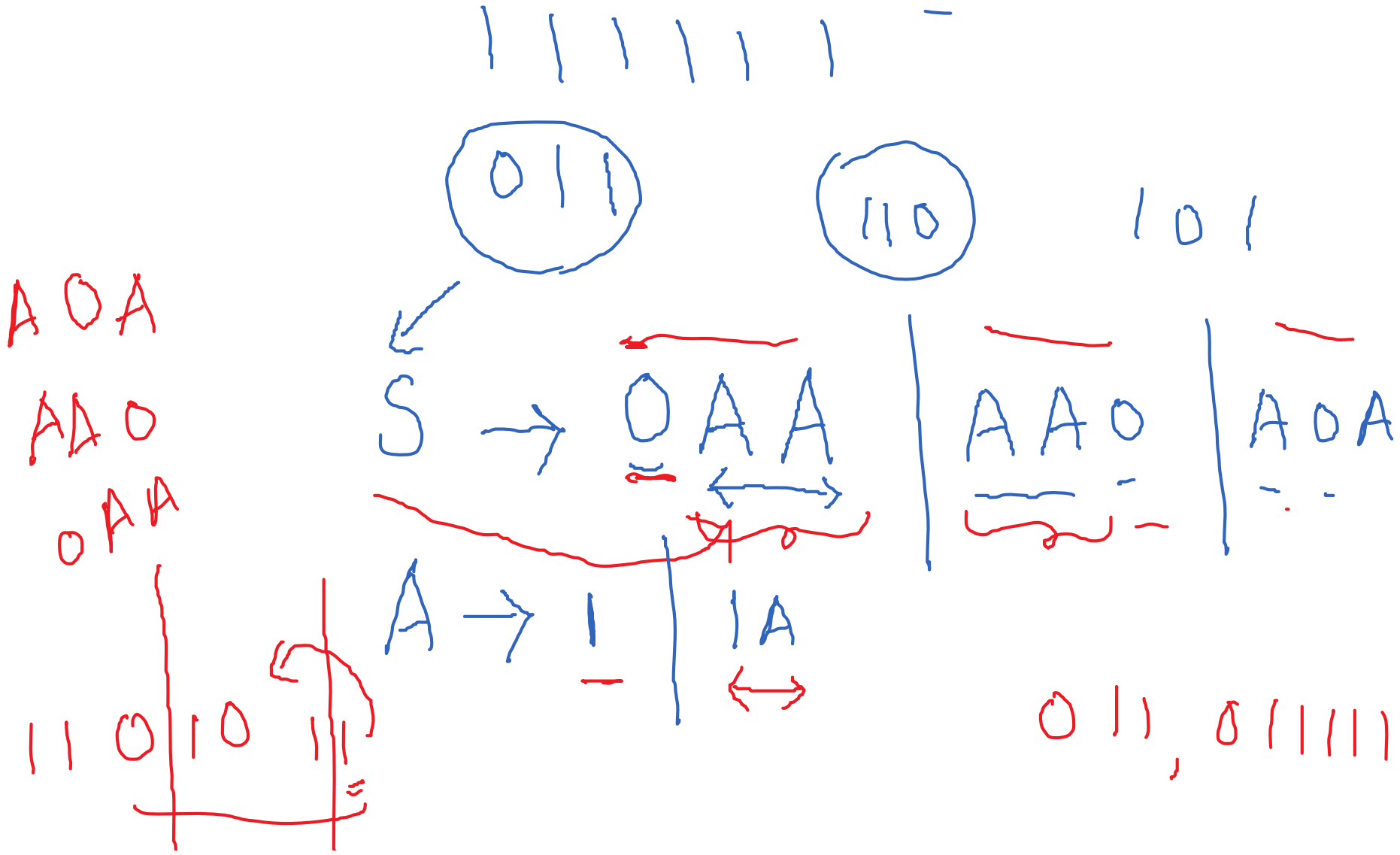
$$L = \{ x \mid x \in \{0,1\}^* \quad \#_1 > \#_0 \}$$

CFG



011, 110, 101




S → 0AA | AA0 | A0A
A → 1 | 1A
011, 01111
110
10
11

$A \rightarrow 0AA \mid AA0 \mid A0A$

$A \rightarrow 1 \mid 1A$

$A \rightarrow 0AA$

$\rightarrow 0 \mid AA$

$\rightarrow 0 \mid 1AA$

$\rightarrow 0 \mid 1 \mid AA$

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

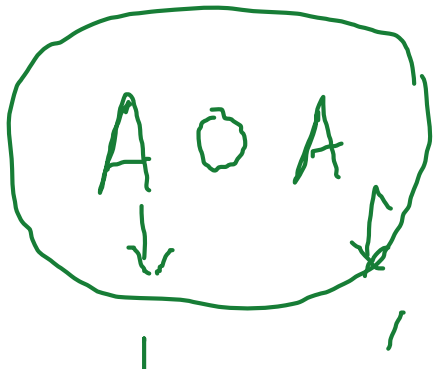
$0AA$

$\rightarrow 0A0AA$

$\rightarrow 0 \mid 0 \mid A$

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

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



$A \to 0AA \mid AA0 \mid A0A \mid \varepsilon$

$A \to 1 \mid 1A$

$(N=\{A\}, T=\{0,1\}, P, S=\{A\})$

$\#_1 > \#_0$

111

$A \to 1A$

$\to 1 \mid 1A$

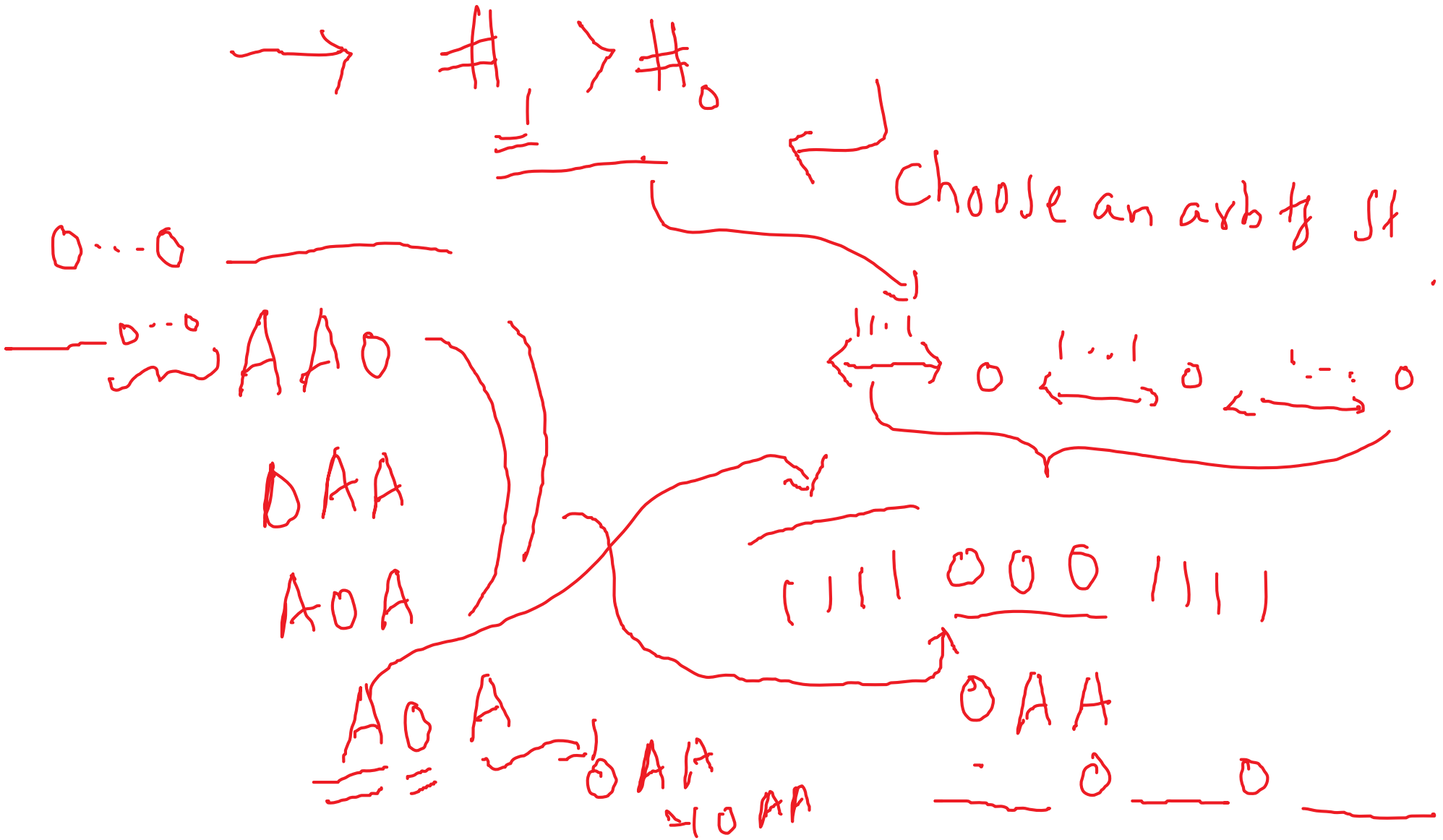
$\to 1 \mid 1 \mid 1$

0 1 1 0 1 1 1 1

$A \to 0AA$

$1A \; 0AA$

$1 \; 0 \; 1A \; 1A \; 1A$


Choose an arb tg st
0...0
AAO
DAA
AOA
AOA
OAA
OAA
OAA
0
0
0

L_1

$\#_0 > \#_1$ $\begin{cases} B \to 1BB \mid BB1 \mid B1B \\ B \to 0 \mid 0B \end{cases}$

$\#_1 > \#_0$ $\begin{cases} A \to 0AA \mid AA0 \mid A0A \\ A \to 1 \mid 1A \end{cases}$

L_2

$L_1 \cup L_2 =$ $S \to A \mid B$ $\{x \mid \#_0 \neq \#_1\}$

$$L = \{ a^n b^n c^n \mid n \geq 1 \}$$

$a^n b^n c^m$

$a^m b^n c^n$

$$L_1 = \{ a^n b^n \mid n \geq 1 \} \qquad L_2 = \{ b^n c^n \mid n \geq 1 \}$$

$L_1 \cap L_2 \neq L$

$L_1 = \{ a^m b^n c^n \}$ $L_2 : \{ a^n b^n c^m \}$

DFA

L_1 L_2

$L_1 \cap L_2$

$S \to AB$

$A \to aA \mid a$

$B \to bBc$ CFG$_1$

$B \to bc$?

PDA

$S_2 \to XY$

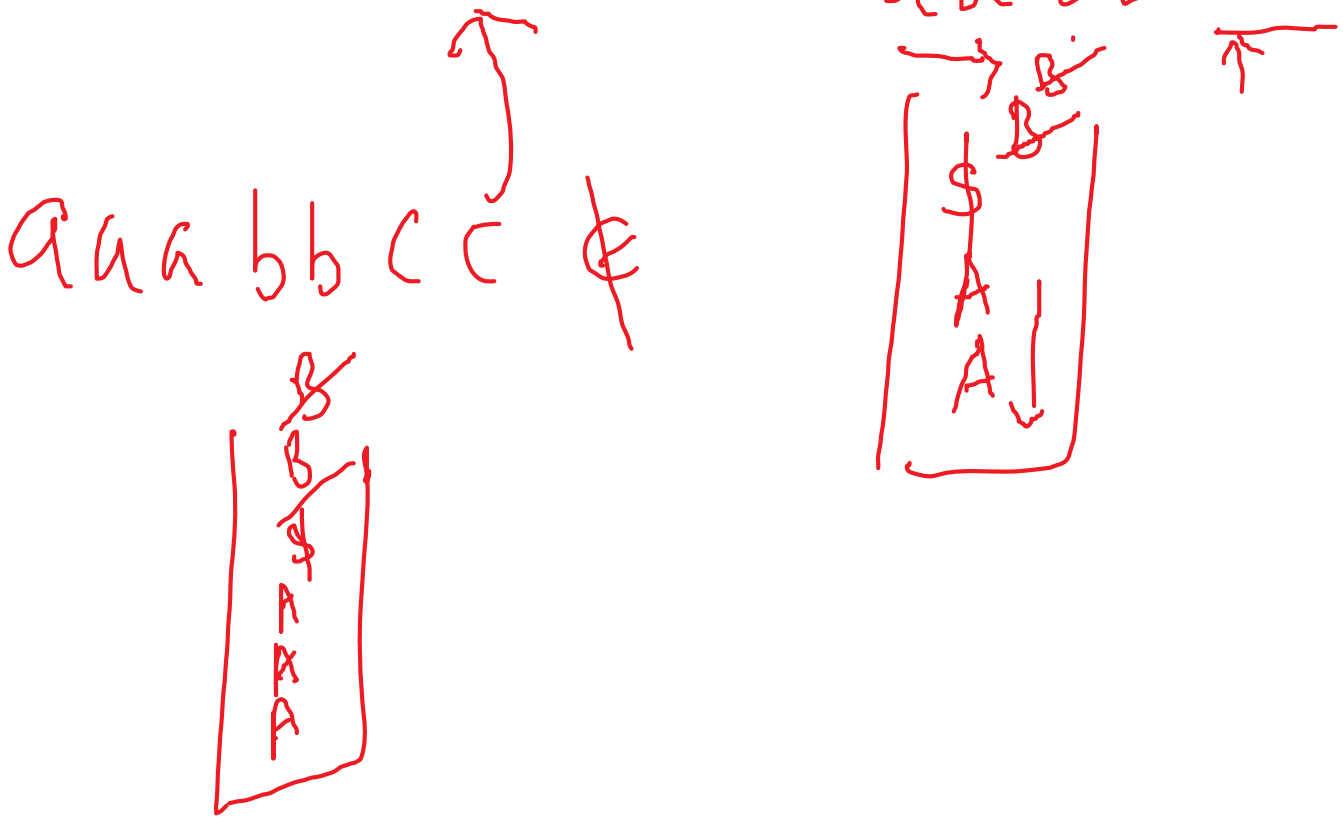
$X \to Xab$

CFG$_2$ $X \to ab$

$Y \to c \mid cY$

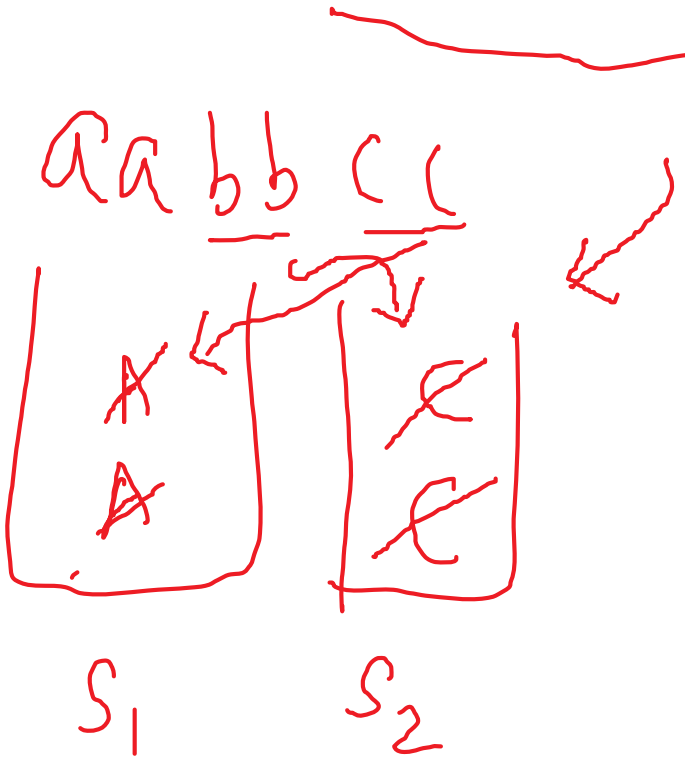
$L_1 \cap L_2 = \{ a^n b^n c^n \ (n \geq 1) \}$??

$\{ a^n b^n c^n \mid n \geq 1 \}$



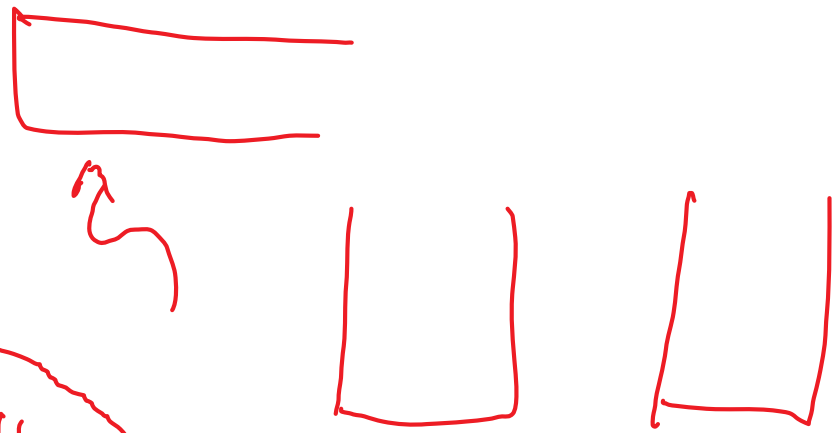
$L = \{a^n b^n c^n \mid n \geq 1\}$

PDA + one more Stack.



$\#_b = \#_a$

$\#_c = \#_a$



S_1 = FA + Queue

PDA - Stack + Queue

1) PDA + one Add Stack $\equiv$ PDA.

2) PDA $\equiv$ FA + Queue

$a^n b^n$ $\quad$ $a^n b^n$

Unequal no. of a's & b's $\quad$??

$a^n b^n c^n$??

Great @ 2pm