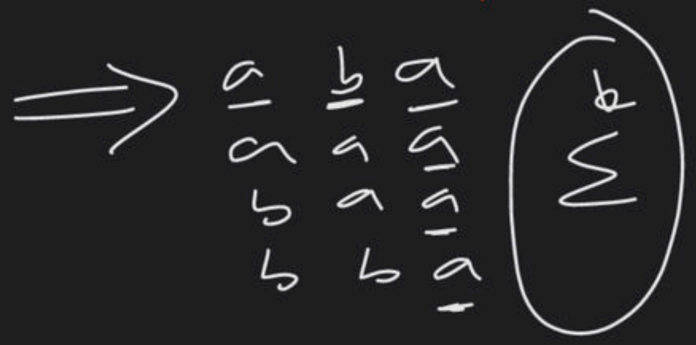
DFA Construction - VI

Complete Course on Theory of Computation

Subbarao Lingamgunta • Lesson 10 • Feb 15, 2022

cm-DFA $L = \{$ Set of all strings of a's & b's where a in every string 3rd symbol from LHS is a$\}$.

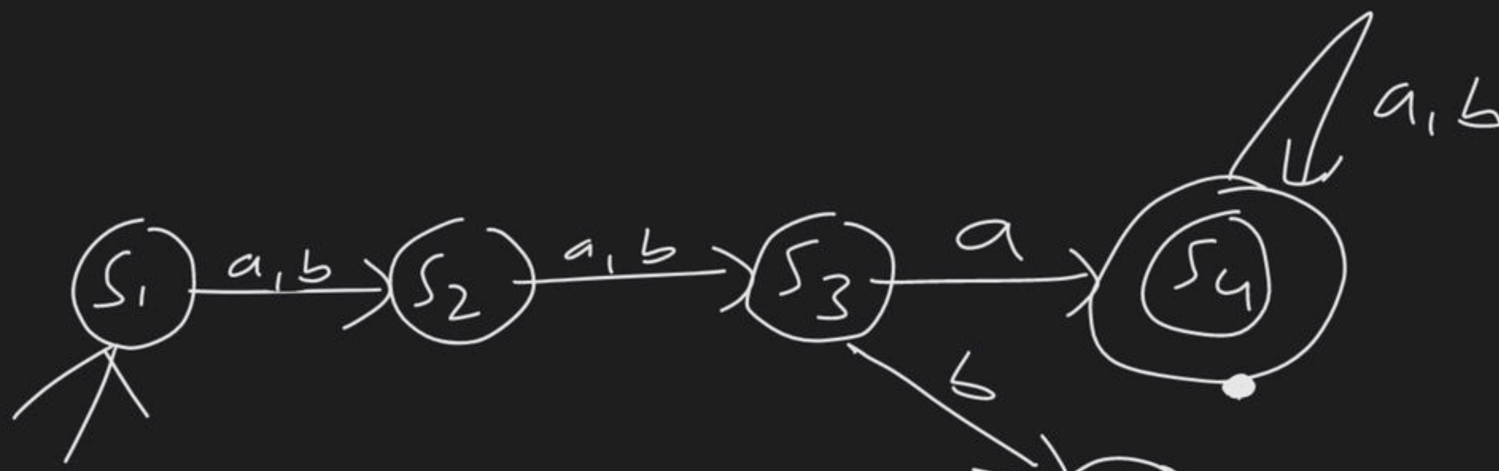
$\Sigma = \{a, b\}$



3rd — LHS — a $\Rightarrow$ 4+1 $\Rightarrow$ 5

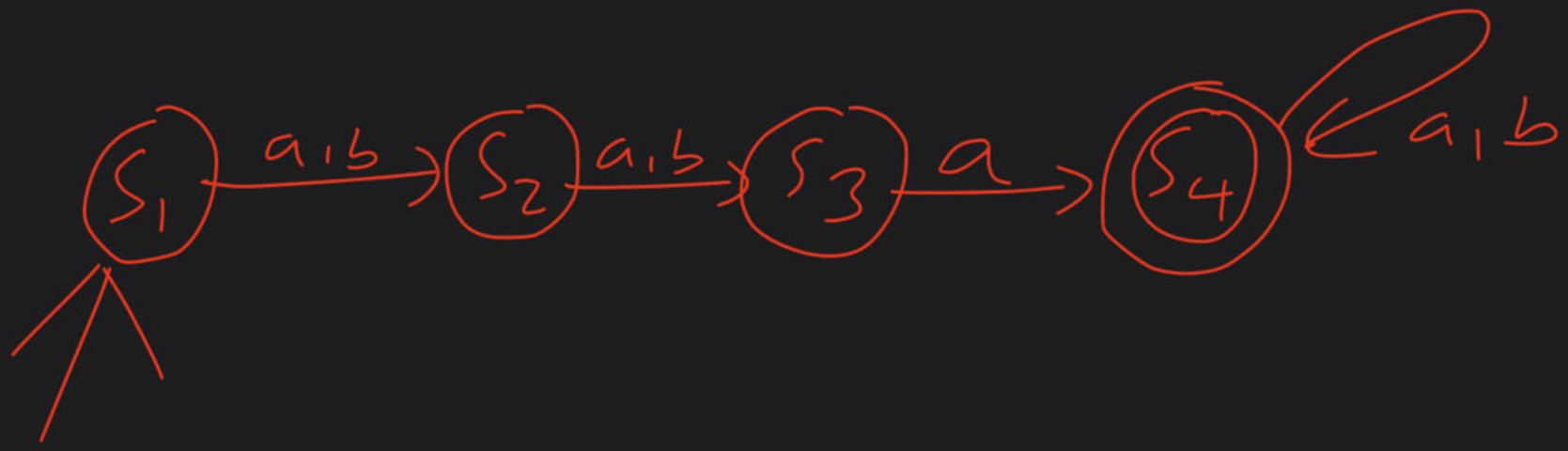
100 — " — " $\Rightarrow$ 101+1

n — " — " $\Rightarrow$ n+1+1 $\Rightarrow$ n+2



$(\Sigma)^2 a (\Sigma)^*$

3rd - symbol from LHS - a $\Longrightarrow$ NFA

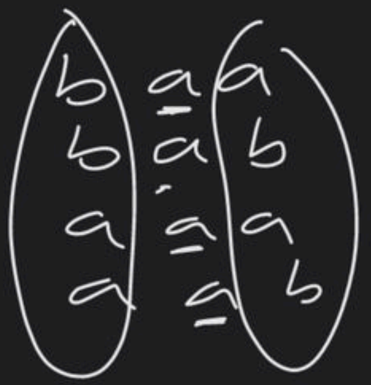


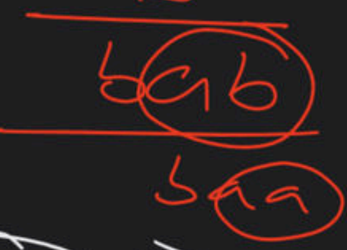
NFA $\Longrightarrow$ 3 - LHS $\Rightarrow$ 4

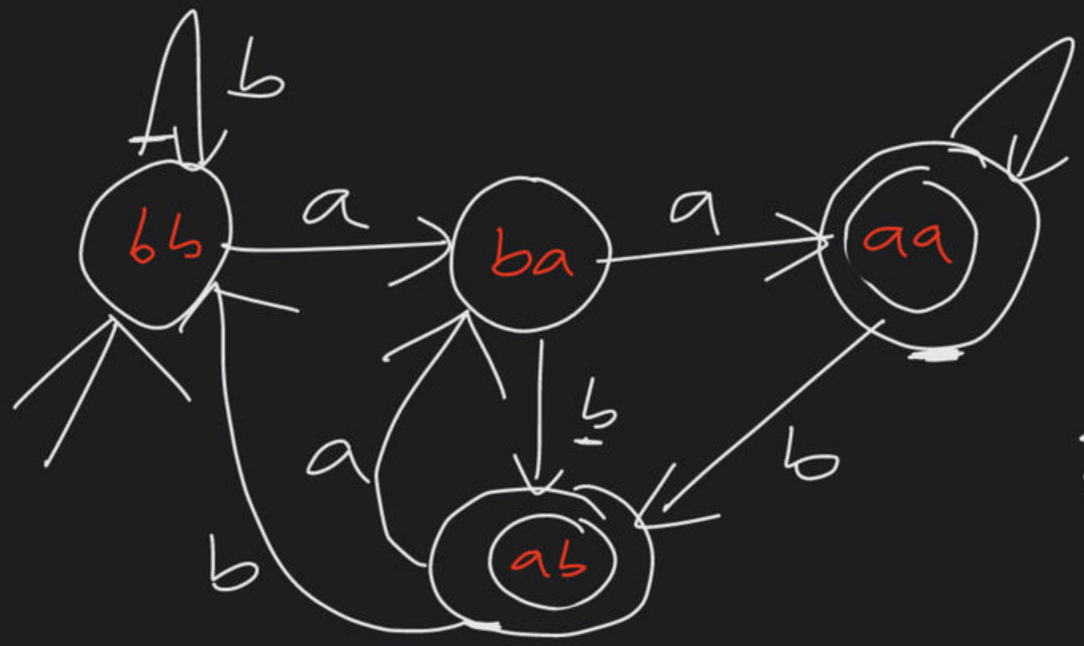
n - LHS $\Rightarrow$ n+1

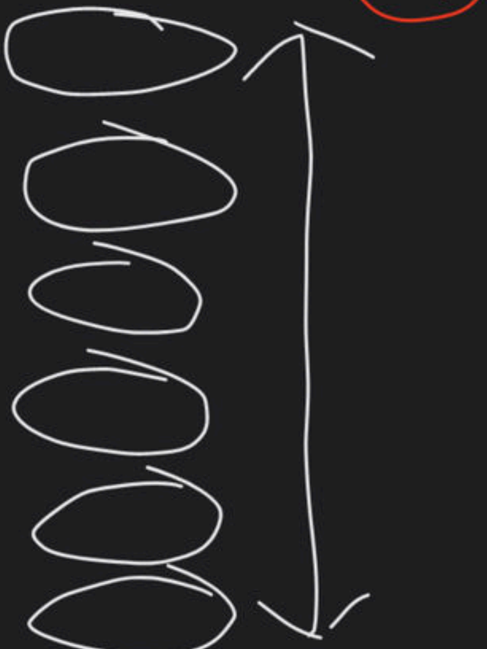
CM-DFA $L = \{$ set of all strings of a's & b's where in every string 2nd symbol from RHS is a $\}$

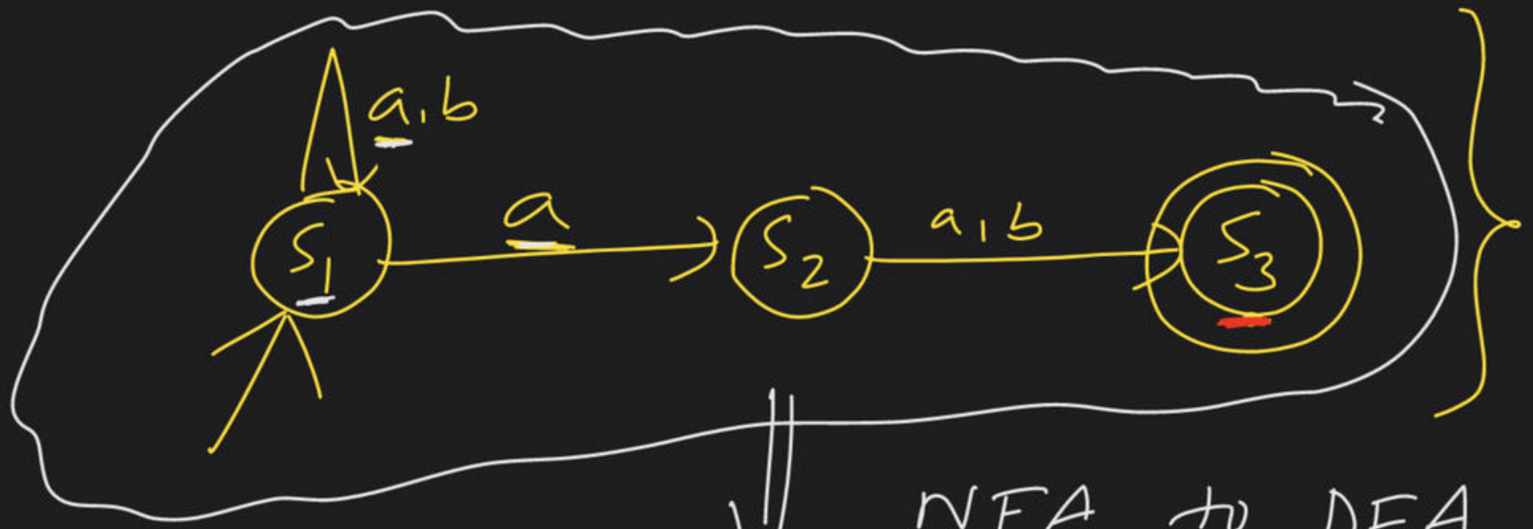
$\Longrightarrow (\Sigma^* a)(a+b) \Longrightarrow \Sigma^* a \Sigma^1 \Longrightarrow aa, ab,$







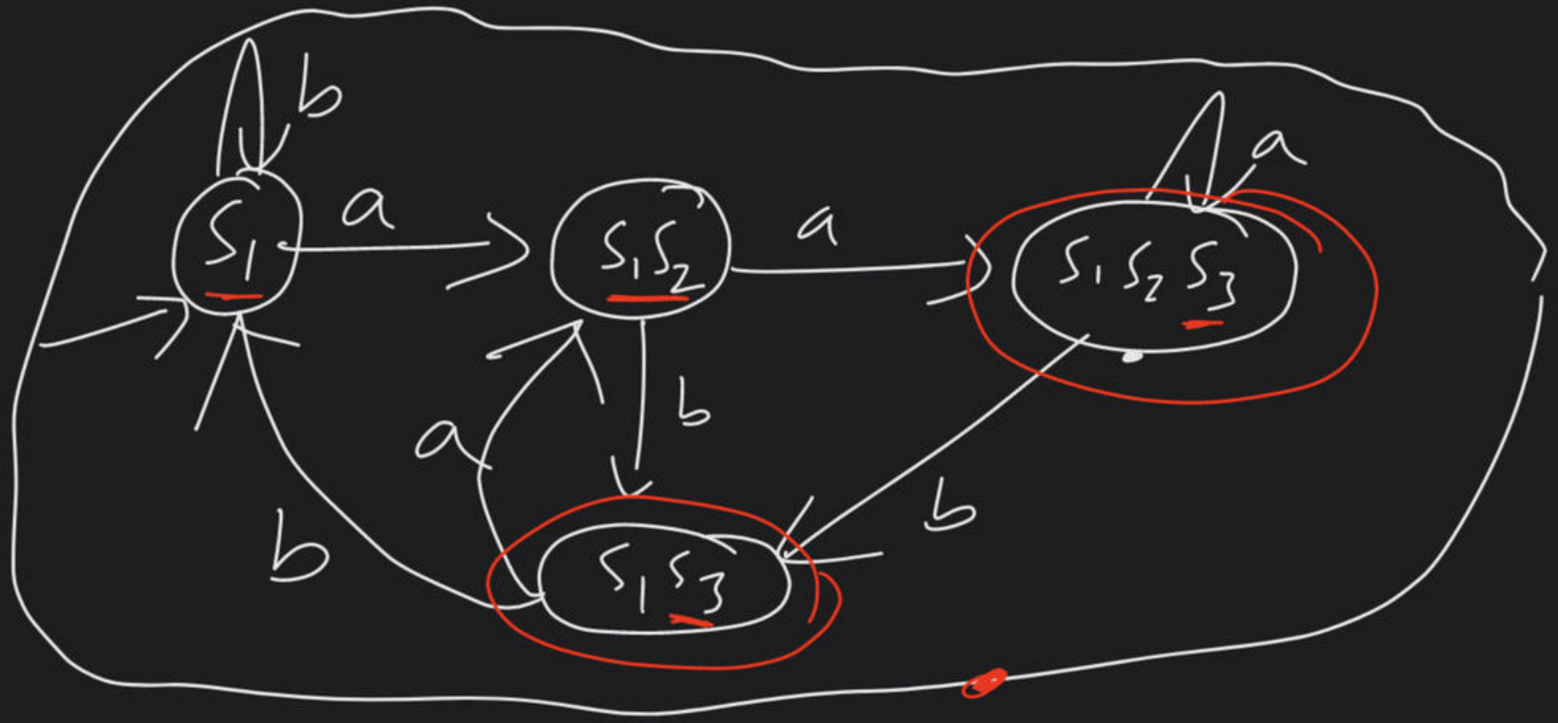




2nd RHS - a ⇒ NFA

3 - states

NFA to DFA conversion



20

$S_1S_2 \xrightarrow{a} S_1S_2$

$S_1S_2 \xrightarrow{b} S_1 \xrightarrow{b} S_1$

$S_1 \xrightarrow{b} S_1$

$S_2 \xrightarrow{b} S_1S_2$

$S_1S_2 \xrightarrow{b} S_1S_2$

(1) Take NFA start state

(2) apply all symbols from Σ one by one.

(3) if new state continue 2nd step.

(4) while applying transitions see NFA.

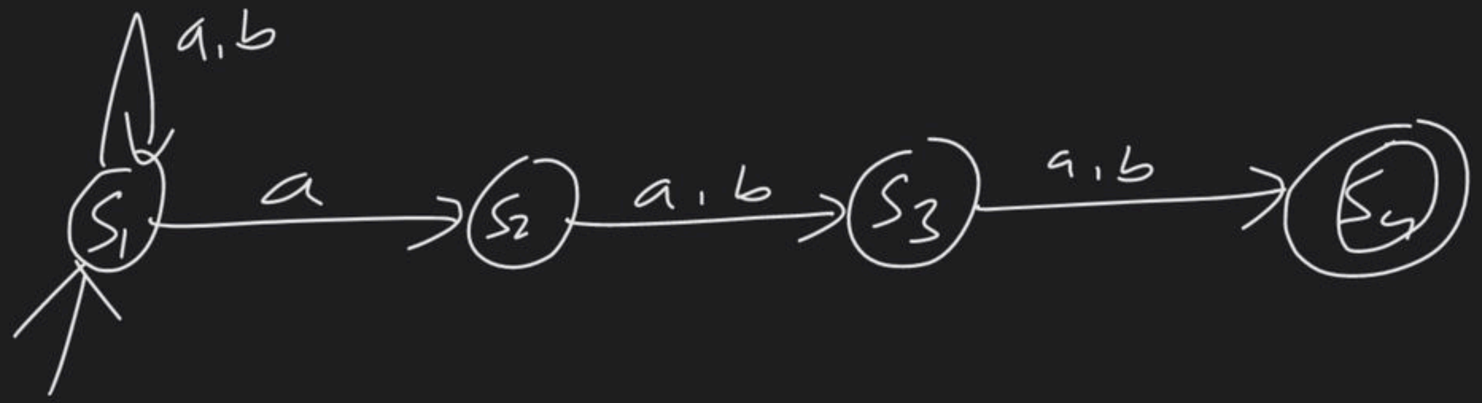
(5) NFA final where is present in DFA make them as Final.

(6) if no new state stop.

3rd symbol for our RHS is a

$\Rightarrow$ Last 3-symbols Target $\Rightarrow$ a(aa / bb)

3rd symbol – RHS – a } NFA.



} 4-states

∈-V-yes

1-IV also

don't say yes

few - invalid

If not covered

2^{nd} — RHS − a $\Rightarrow z^2$

3^{rd} — RHS − a $\Rightarrow z^3$

n^{th} — RHS − a $\Rightarrow z^n$

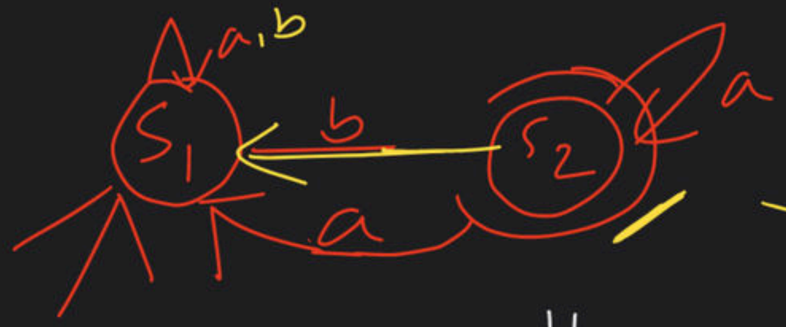
} DFA

2^{nd} — RHS − a $\Rightarrow$ 3

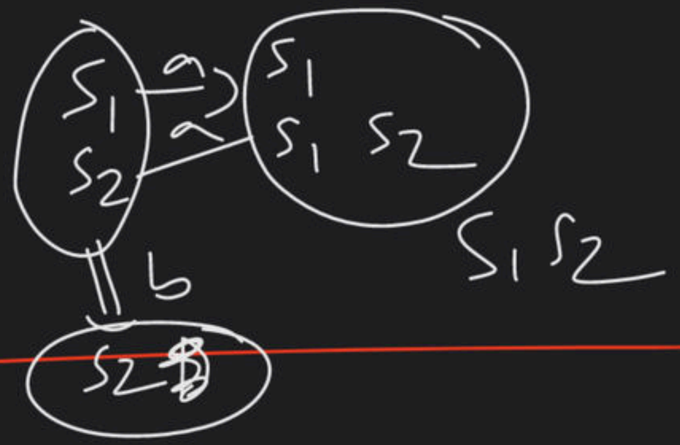
3^{rd} — " " $\Rightarrow$ 4

n^{th} — " " $\Rightarrow n+1$

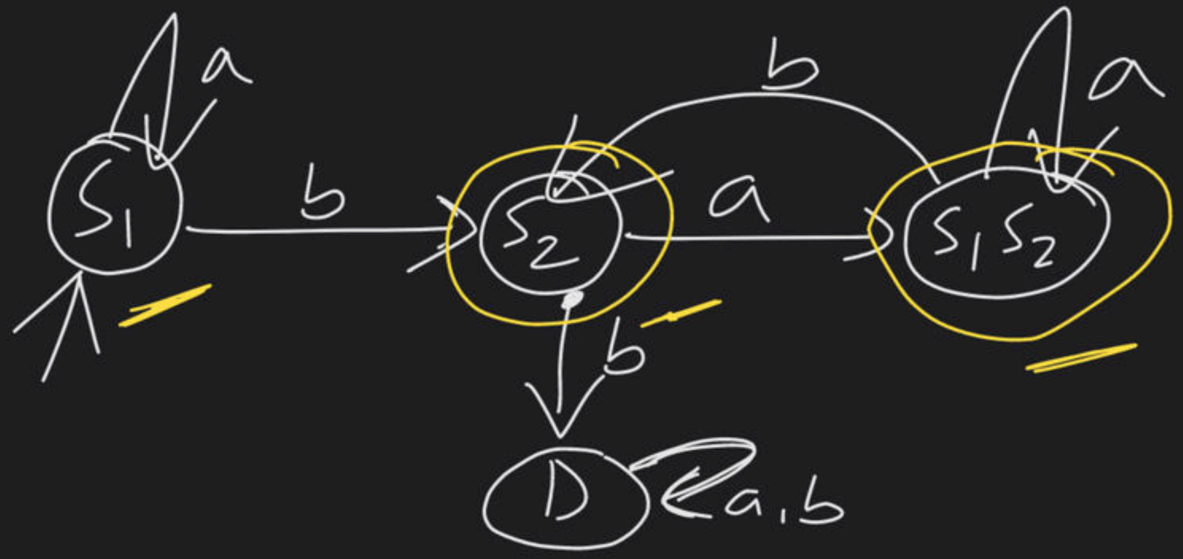
} NFA



NFA



DFA



$Q = \{S_1, S_2\}$

$P(Q)$ or 2^Q =

$\{S_1\}$

$\{S_2\}$

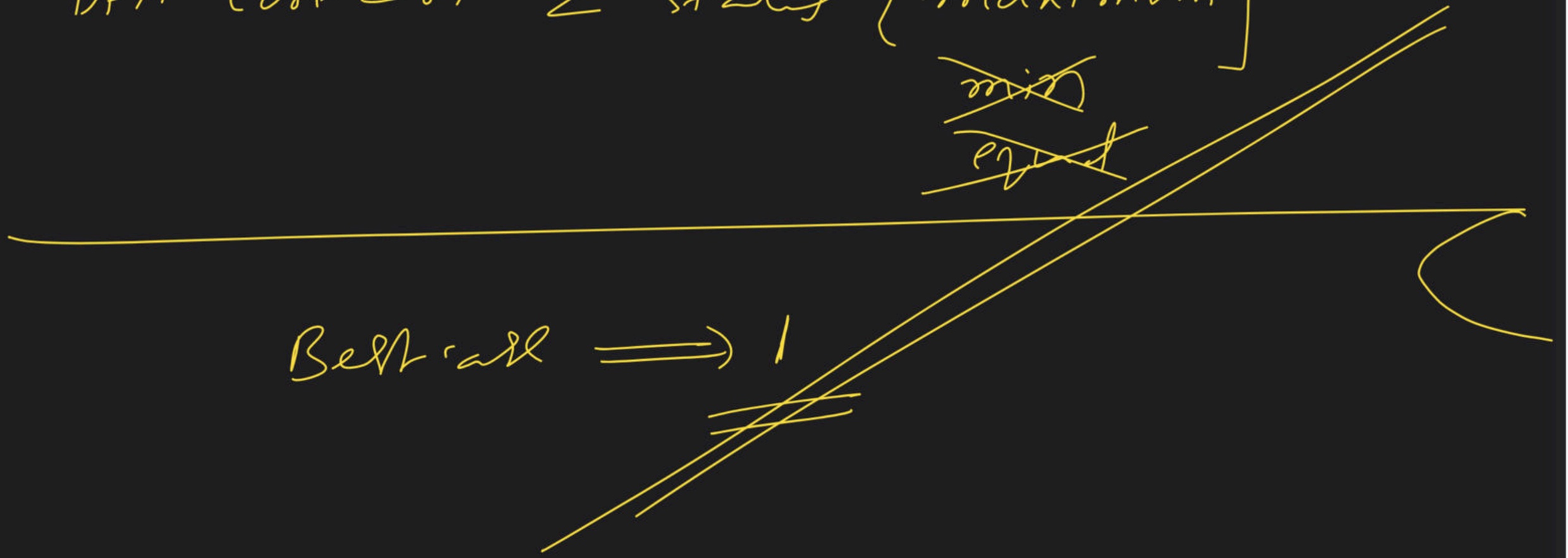
$\{S_1 S_2\}$

If NFA contain n-states then equivalent

DFA contain 2^n states [maximum]

~~min~~

~~equal~~



Thanks

Dedicate Hdts