ε

Regular Grammar

Regular lang → Finite Automata

Linear ⊆ Grammar (|A| = |B| = 1)

$A \to \alpha B$

$A \to V_n$

$\hookrightarrow \varepsilon^* V_n$

$\to V_n \varepsilon^*$

$B \to \varepsilon^* / V_n$

(ε°)

$L = \phi$ — Empty

Empty → Finite → Always Regular

Non-Empty

Non-Empty → Finite → RL

Non-Finite → Check

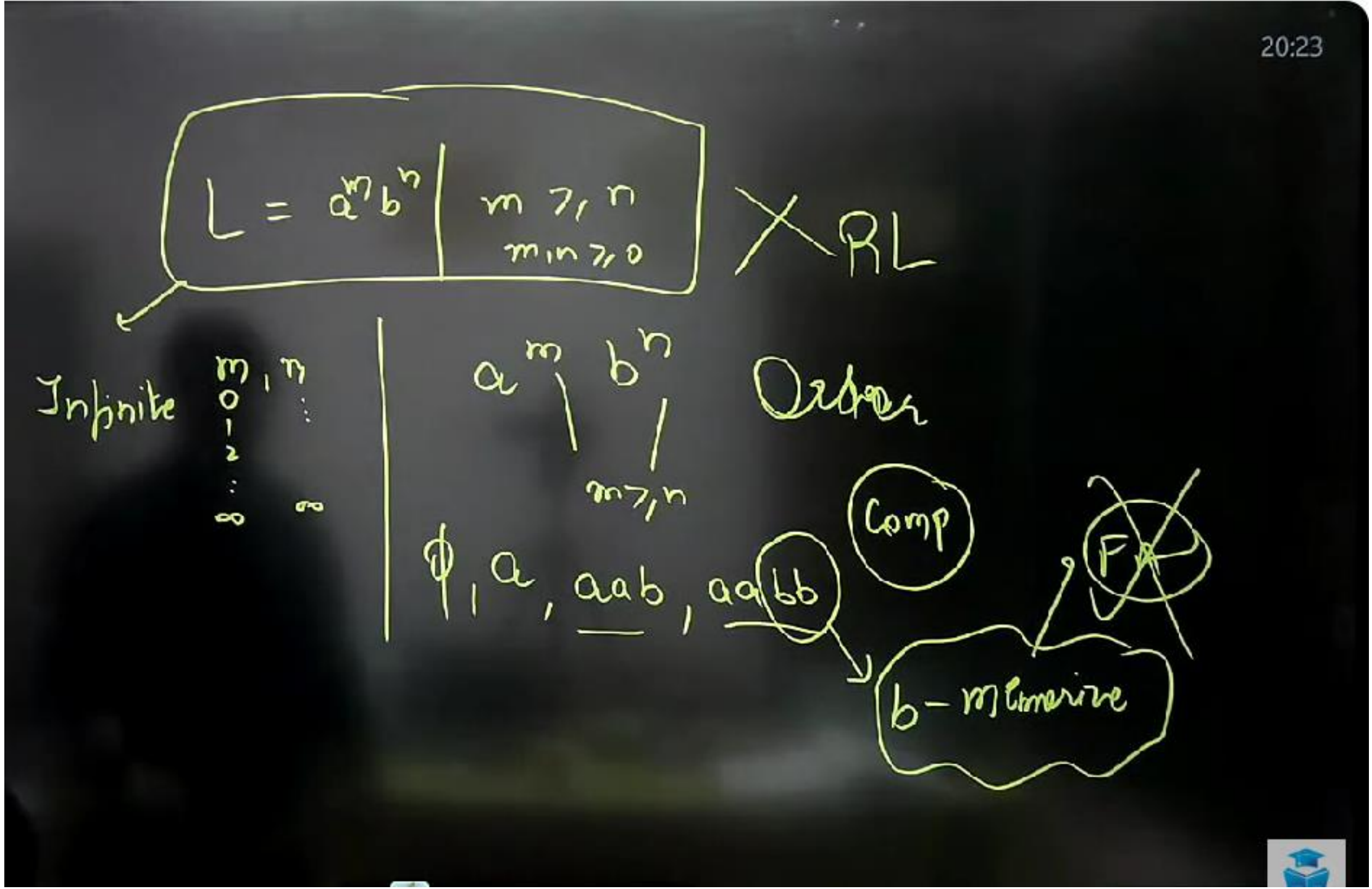
1. Ogden → RL
2. Pumping lemma → ✗ RL

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

✓ Regular

Infinite

$$\{ \phi, ab, aabb, abb, a, b, aab \}$$


20:23
$L = a^m b^n$
$m \geq 1, n$
$m, n \geq 0$
X RL
Infinite
m, n
0
1
2
∞ ∞
$a^m b^n$
$m \geq 1, n$
Order
$\phi, a, aab, aabb$
Comp
F
b-machine

* Ratna Nhi hai नहीं तो Patna Shift kr dungi.

↳ Application

Comparison

↳ strings Bnakar dekho.

↳ Try to make a string which contradicts the given lang

Ex $\{a^n b^n \mid 1 \le n \le 10\}$ (Finite) ✓ RL

Ex $\{a^n b^n \mid 1 \le n \le 2^{31^{st}\text{ Power of 2}}\}$ ✓ RL

Ex $\{a^n b^n \mid 1 \le n \le 2^{|GATE|}\}$ → ✓ RL

Ex $\{a^n b^n \mid n \ge 0\}$ — Comp Yaad → ✗ RL

$a = b$

NET PYQ

Ex $a^m b^n \mid m, n \geq 0,\ m > n$ ✗ RL

$L = a^m b^n \mid m, n \geq 0,\ m \neq n$) → ✗ RL

याद रखना पड़ेगा

कि m / n दोनों

equal ना हो जाए।

$[a^m b^n \mid m+n = \text{even}]$ Finite → Regular ✓

even + even = even ✓	Finite
odd + odd = even	Finite
even + odd = Odd	✗

↓

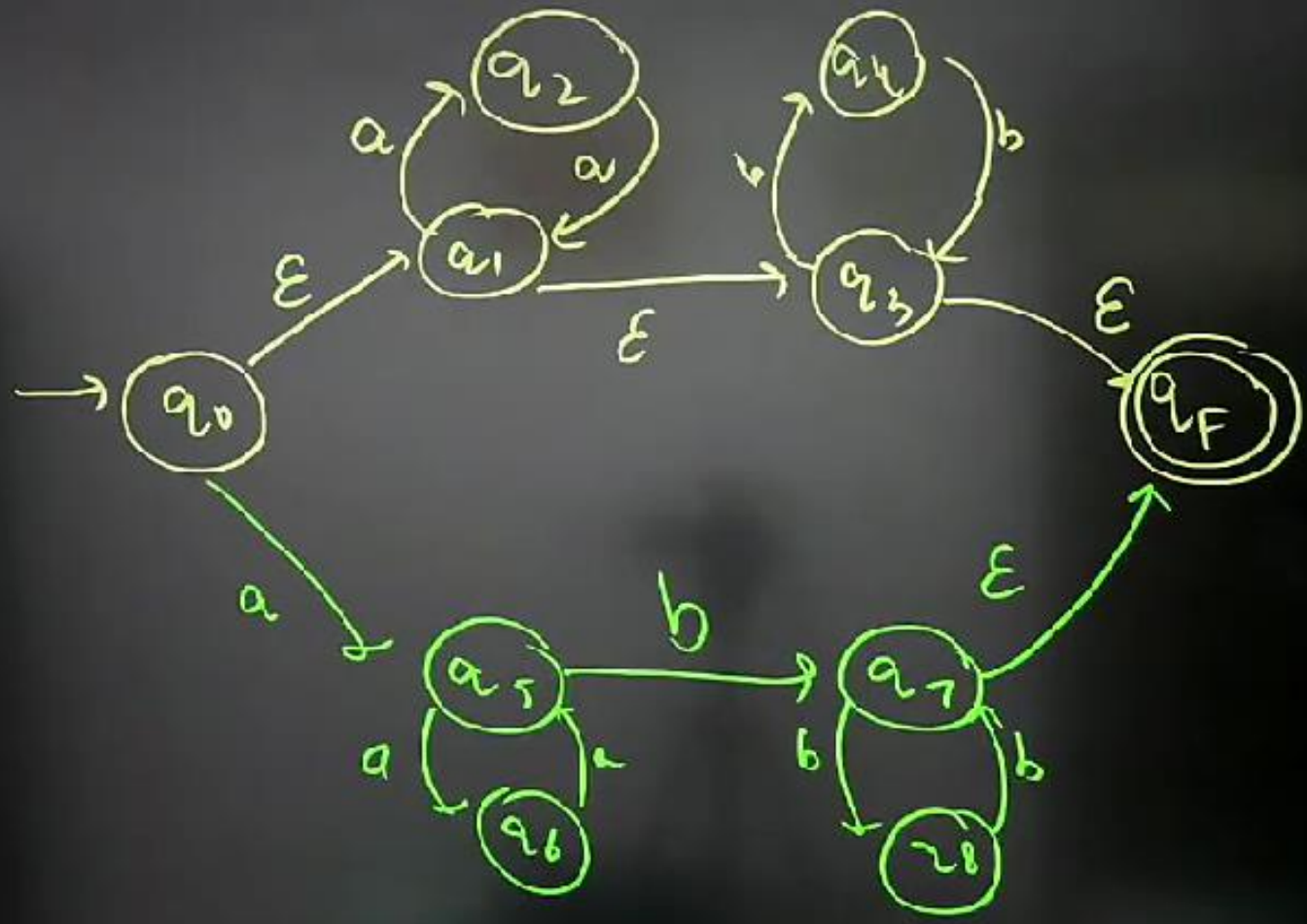
✗

✓

Yes RL

$[a^m b^n \mid m+n = \text{odd}]$

* H.W



20:48

$$L = \{ w \mid w \subseteq w^r \mid w \in \Sigma^* \}$$

$\Sigma = (a, b)$ → Σ^+

w^r	w	w^r
Yes	ab	ba
NR	aabb	bbaa
	abab	baba

$\subseteq$, $\subset$ × RL

$w \; C \; w^R$

Σ^+

Σ^*

$\underline{w} \; C \; \underline{w^R}$

aaba C abaa

2.

X

$$w\,c\,w^r \mid c, w \in \Sigma^*$$

ab aba ba

$\frac{aba}{c}$

$w \downarrow \varepsilon$

$c \downarrow \varepsilon$

$w^r \downarrow \varepsilon$

aba

RL

c is a symbol

Starting with 1 symbol & ending with different

$c w w^R \mid \Sigma^*$

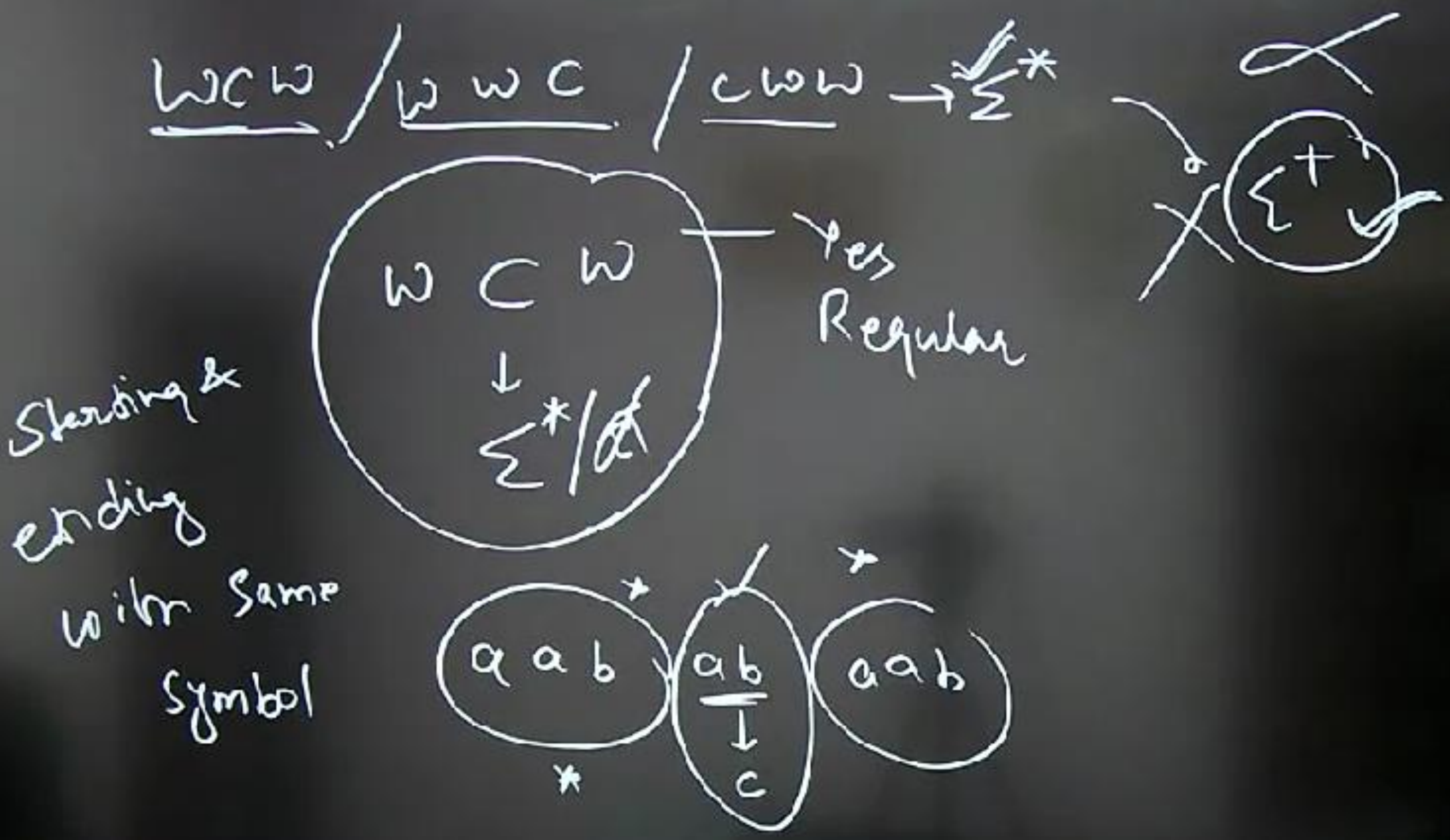
$w w^R c \mid \Sigma^*$

Regular

$w c w^R \; \Sigma^+$

$c w w^n$
$w w^n c$ Σ^+ $\times$

$w \neq \varepsilon$ $\times$


wcw / wwc / cww → Σ*
Σ+
Yes Regular
wcw
Σ*/α
Starting & ending with same symbol
aab
ab
c
aab
21:06