

① If L is rec item L' also rec

② If L is REL item L' may be REL
(or)
may not be REL

③ If L & L' both are REL item both are Rec.

④ If L is REL but not Rec item
 L' is not REL

⑤ If L & L^c are complement to each other
then

(i) both L & L^c are Rec ✓

(ii) one is REL but not Rec another not
REL ✓

(iii) Both are non-REL. ✓

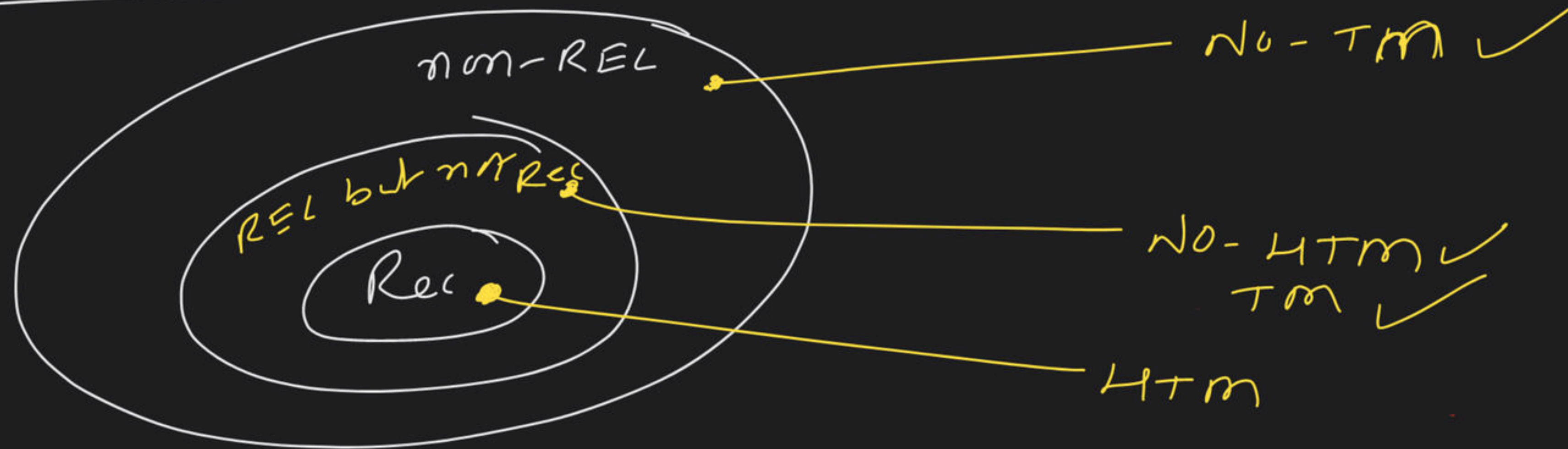
(iv) one is REL another Rec. ✓

(v) both are REL but not rec

(vi) both are rec but not REL

(vii) one Rec and not Rec

(viii) both are not Rec ✓



Undecidability / Decidability

- ① Emptiness problem of FA (Decidable)
- ② Equality " " (")
- ③ Finiteness " " (")
- ④ Membership " " (")
- ⑤ ^{completeness.}
Tidality " " (")
- ⑥ Co-finiteness " " (")

⑦ Intersection empty " " " (Decidable)

⑧ $FA_1 \subseteq FA_2$?

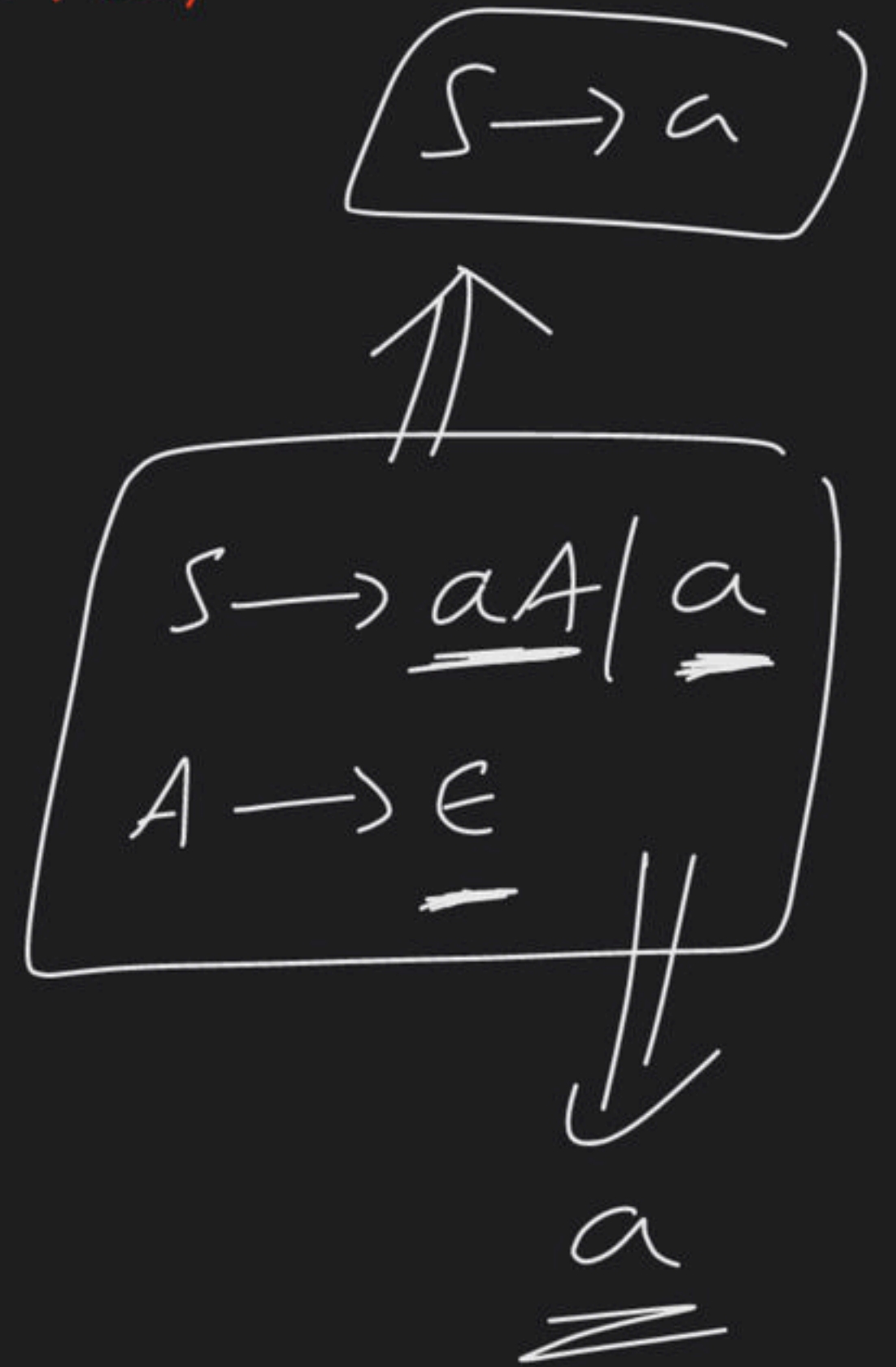
\Downarrow

$$FA_1 - FA_2 = \emptyset$$

construct product machine
re

check for empty.

⑨ Ambiguity problem of Regular language.



For CFL

Finite sets ✓

emptiness ✓

membership ✓



DCFL

for the given ambiguous regular grammar
equivalent unambiguous regular grammar possible.

\Rightarrow decidable. (write regular grammar
from NFA)

Turing machine (Undecidability | Decidability)

① Halting problem of TM

Given $TM - M$, string w

Does M halt after reading w ?

\Rightarrow undecidable.

FA

DPDA

NPDA

LBA

TM

\Downarrow

Decidable



② membership problem of TM

\Downarrow

Given TM - M , String - w

Does w is member of M ?

\implies Undecidable.

③ Blank Tape Halting problem undecidable.

\Downarrow

Given TM halt on blank Tape?

④ state entry problem of TM.

Given TM M , state s_5 or string w

Does M enter state s_5 while

processing string w ?

\Rightarrow undecidable

⑤ PCP is undecidable.

⑥ m -PCP " "

⑦

Given $\text{tmm} - m$, String - w

Does m halt after K -moves?

(or)

(or)

K -steps

at least

(or)

at most

\Rightarrow Decidable //



Do
practice

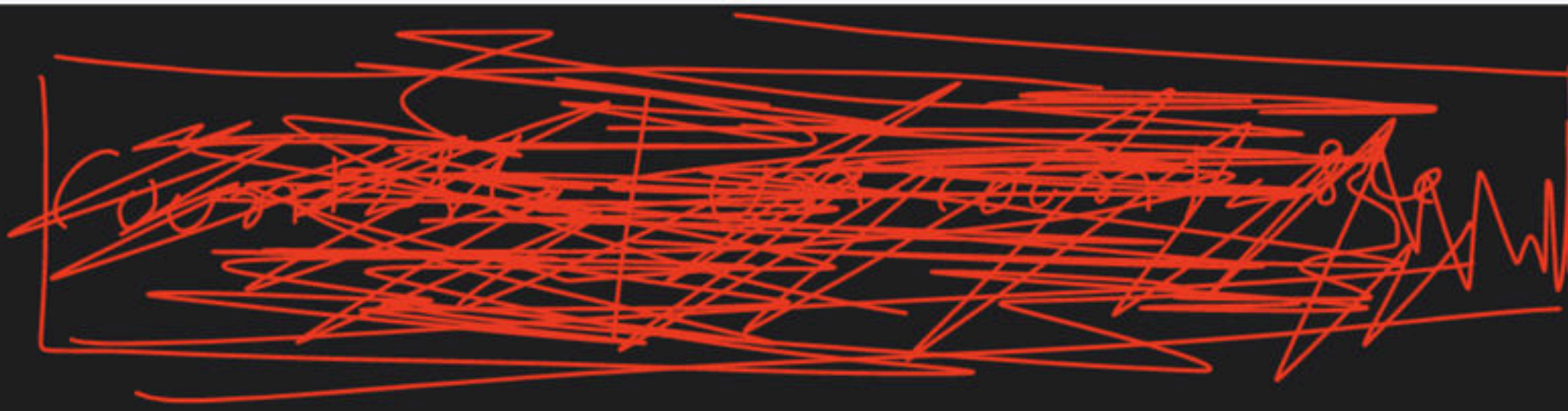
clone
projects

DFA (30)

RE (20)

PDA (10)

Tm (5)



Dedicated Help

~~Gam~~

Gam

