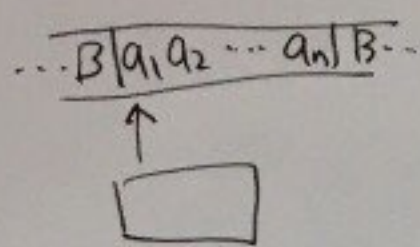


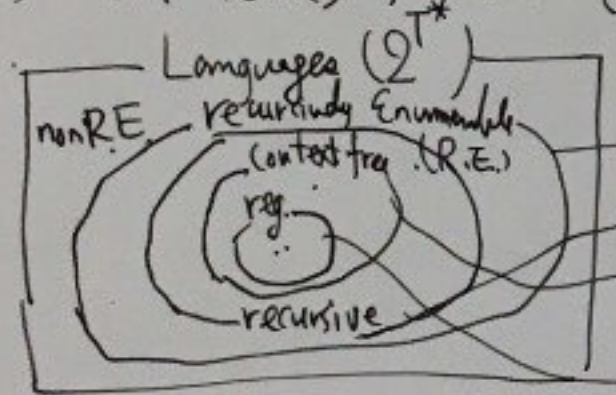
TM. $\delta: Q \times P \rightarrow Q \times P \times \{L, R\}$ $\Gamma \in P$
 $L(M) = \{w \in T^* \mid (\epsilon, q_0, w) \xRightarrow{*}_M (\alpha, f, \beta), f \in F\}$



Tape is stack is $\Sigma^* \cup \epsilon$
 (X tape is sequential access)
 random access
 Tape is $C \cup \Sigma$ $\frac{1}{2} \cup u$

- TM
- i) TM halts and accept w.
 - ii) TM " " not " "
 - iii) TM runs forever (does not accept w)

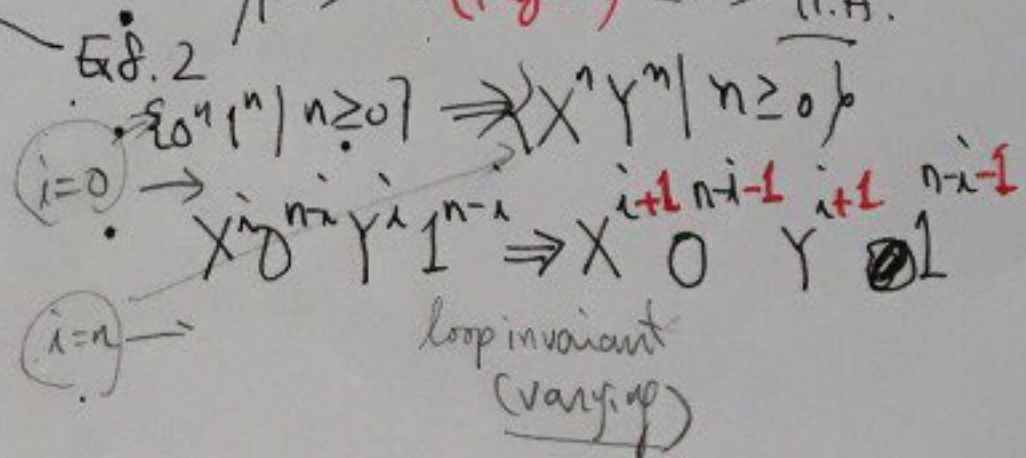
Automata



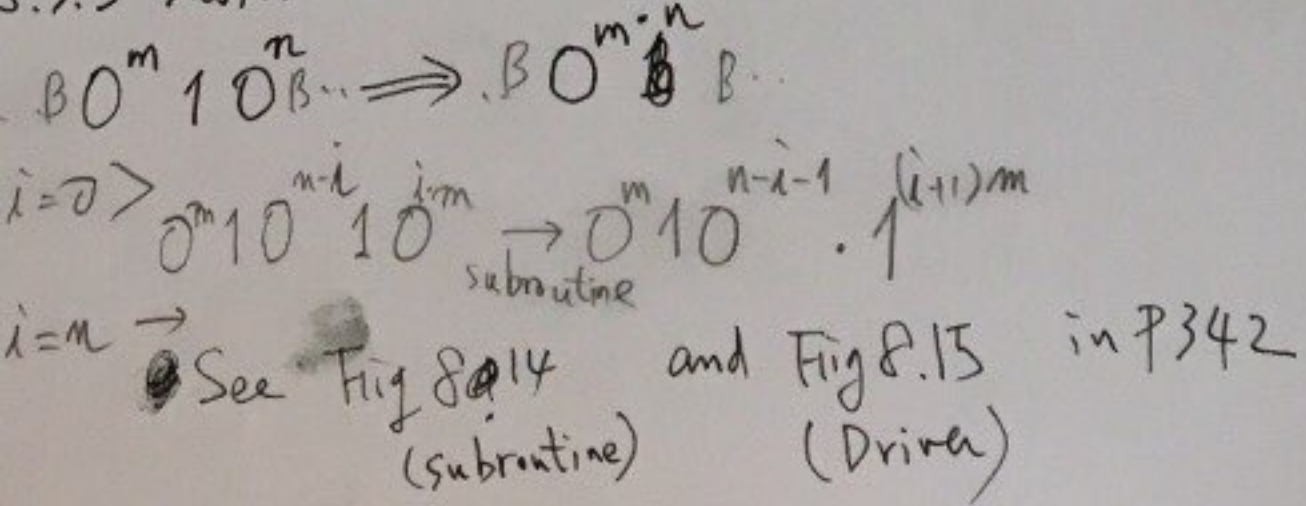
Chomsky's language hierarchy

- type 0 lang. (R.E.) \leftrightarrow TM = FIATape
- type 1 "(Recursive)" \leftrightarrow always terminate
- type 2 "(Context-free)" \leftrightarrow PDA = FIAT stack
- type 3 "(Regular)" \leftrightarrow F.A.

8.3.2 Multiple Track
 Track ... m-bit



8.3.3 Subroutine



8.4 Extension to the Basic TM.

Multitape TM. $\xrightarrow{\text{ktape}}$ k -tracks $\left\{ \begin{array}{l} 1. \text{ tape contents} \\ 2. \text{ head position} \end{array} \right.$

Nondeterministic TM

decision tree

$k^n \dots$ (NP) exponential (intractable of Cook's idea)

8.5 Restricted TM

8.5.3 Stack Machine: = Counter machine

Thm 8.13 Two stack machine = TM

Thm 8.14 Three counter = TM

Two counter - tape - push/pop \rightarrow $\frac{2}{2}$ 바꾼다
One counter - FA

Thm 8.15 Two counter TM

소인수 분해

Crap 9. Undecidability

TM = number!

program? — countably infinite $P \in \Sigma^*$

TM? — //

TM M 에 번호 i 를 붙이자 M_i (enumerate)

$\Delta \in \Sigma^*$ Σ countable x_i

$L_u = \{ x_i \in \Sigma^* \mid x_i \in L(M_i) \}$ $\xrightarrow{\text{번호 붙이지}}$ R.E.

$L_d = \{ x_i \in \Sigma^* \mid x_i \notin L(M_i) \}$ \rightarrow X R.E.