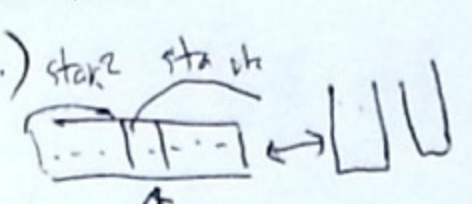


P.4 Extension of TM
 Multi tape TM — register, stack, mem, disk — c
 Coding Theory
 Nondeterministic TM — decision tree

NP. $O(k^n)$
 P.5 Restriction of TM

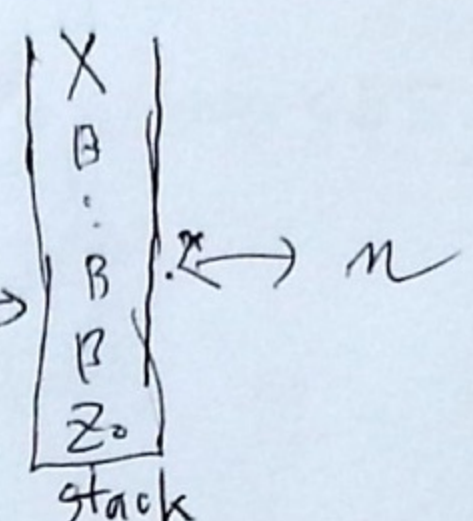
Thm 8.13 tape of TM \leftrightarrow 2 stack



Thm 8.14
~~Thm 8.14~~

Counter machine
 (37)

stack alphabet $\Sigma = \{Z_0, X\}$
 PDA
 Two counter + One counter
 ← push, pop



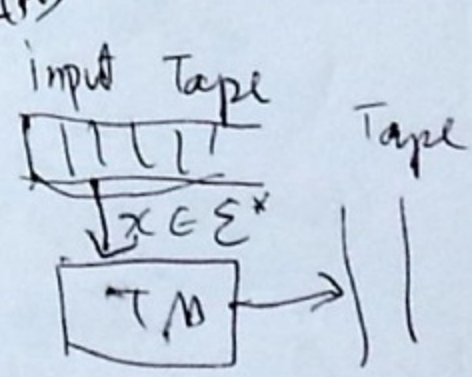
Thm 8.15 3 counter \rightarrow 2 counter

~~2 counter~~ 소인수 분해
 $3 \leq i, j, k \dots \rightarrow \frac{1}{T} m$
 $m = 2^i 3^j 5^k$

or) $(2, 3, 5)$
 $= 2^2 3^5 5^3 = 4 \times 81 \times 125 = 12,150$

Enumeration machine \leftarrow ~~generate~~ output $L(M)$

if $x \in L(M)$ — reject!
 if $x \notin L(M)$... infinite loop.



for i next (i) pair (i, j) generate
 simulate x_i for j -steps.

TM = computer, program

TM — conceptual (infinite nat. number)] — Turing-Church's Thesis
 program — ∞ (finite ")
 But we can extend "

Chap. 9 Undecidability -

9.1 A lang. that is not R.E.

halting prob, 이분산, 거짓말쟁이, heterological 이분형용사

Cantor's diagonal argument,

Russel's paradox $S = \{x \mid x \notin x\}$

$$x \in S \iff x \notin x$$

$$S \in S \iff S \notin S!$$

Gödel's Incompleteness Theorem (GIP)
Problem (ICT)

Denial of self-revelation.

자기 자신을 부정하는 것은 존재하지 않는다
무한

Cantor's Diagonal argument. (1812)

$$\mathbb{N} \rightarrow \{0,1\} \stackrel{\text{def}}{=} \{0,1\}^{\mathbb{N}}$$

① 자연수에서 $\{0,1\}$ 로 가는 함수

$$A \rightarrow B \triangleq B^A$$

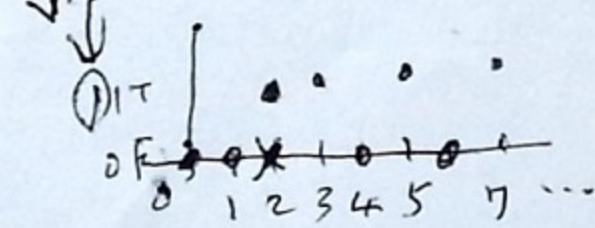
② 자연수의 부분집합

③ 무한 이진수

$\{2, 3, 7, \dots\} \triangleq$

0001101010001...

① Enumerate 해서 (변호를 만들어서)



② 대각선을 ~~찾아서~~ 변을 바꿔서 $0 \rightarrow 1$

$1 \rightarrow 0$

$$(\overline{b_{10}}, \overline{b_{11}}, \overline{b_{12}}, \dots, \overline{b_{1i}}, \dots) \in 2^{\mathbb{N}}$$

$$\alpha \notin 2^{\mathbb{N}}$$

①의 가령이 2^{\aleph_0} 개. 변은 2^{\aleph_0} 개이므로
uncountable