

11/26 (Thu) Turing Machine 2.

Three cases in TM

- 1) halts and $x \in L(M)$
- 2) " " $x \notin L(M)$
- 3) Not halt!!!
(runs forever!)
(infinite loops!) $x \notin L(M)$?

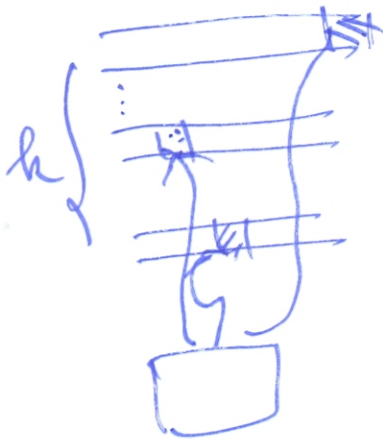
Def L is recursively enumerable,
if \exists TM $M \ni L = L(M)$.

TM
size of tape
... infinite!

Multiple track



Subroutine
Extension of TM
Multi-tape TM.



Nondeterministic TM.

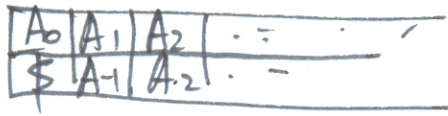


h cases ... exponential
NP problem ... deterministic time

Restriction on TM

Two semi-infinite tape

Thm 8.12 \equiv two-way infinite tape



Multi-stack machine (PDA)



~~Two~~ Two stack machine \equiv TM

Counter Machine stack machine

$P = \{Z_0, X\}$
 \uparrow stack bottom marker \rightarrow # X is repr. a number

Three counter machine \equiv a TM

Two counter .. Two stack machine

One counter .. simulate action of TM

Two counter machines \equiv a TM

Prime number expansion

i, j, k

$$m = \cancel{0} \cdot 2^i \cdot 3^j \cdot 5^k$$

another one .. control

TM is a number! (natural)