

Complexity theory DD 2446

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15 one hour lectures

13 - 11 - 2 - 2h

F2 - F6 proof complexity
2 hw + 1 lecture? \rightarrow
homework $8 \times 2h$

Past:

3hw + no lecture?

weekly small homeworks?



1. Mechanically computable

Recursive function, halting problem

Time & space hierarchies

All Gödel's incompleteness theory

2. NP-complete problems, NP
Cook's theorem SAT is NPC

3. PSPACE complete problems

True Quantified Boolean Formulas

#P, How many satisfying assignments
sharp P
number P

4. L, NL NL-complete P-complete

logarithmic space (non-det)

$$\text{coNL} = \text{NL}$$

5. Boolean circuits



size & depth

time

parallel
time

with NL^k depth $O(\log n)^k$ $O(n^k)$ size

$k \geq 1$ & 2


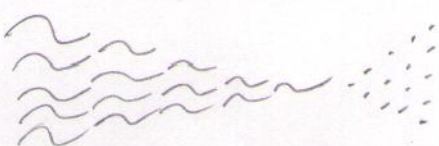
parallel time \sim sequential space

$$NC^1 \leq L \leq NC^2$$

6. Randomised computation

BPP, R, R-NC

Machines that flip coins
and are usually correct

 Mechanically computable 

Turing machine (TM)
Computable by computer-program

Define idealised C
Arbitrarily large integers

Theorem: Functions computable
by a TM and those by
idealised C-programs are the same.
Pract.: Simulate one by the other