

final 4102 review

DEC 9

Final exam



handed out 10p

due 10p

closed book: no aids, notes, internet, colleagues, etc.

↑ APPLIES once you D/L the exam.

WHOLE IS
GREATER THAN
SUM OF PARTS

There I

WHOLE

$$\Theta(n^{\log_b a})$$

$$T(n) = 2T\left(\frac{n}{2}\right) + \Theta(n)$$

$$\Rightarrow \Theta(n \log n)$$

think about form of recursion.

$$\Theta(n)$$

$$T(n) = T\left(\frac{n}{2}\right) + O(1)$$

$$\Theta(\log n)$$

- KARATSUBA MULTIPLICATION
→ 3 problems of size $\frac{n}{2}$

- mergesort
- Bus stops I
- Skyline
- ARBITRAGE

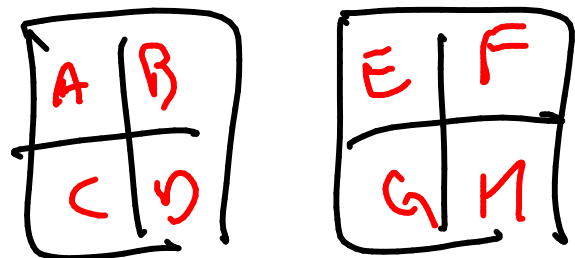
MEDIAN.
(sentence)

BINARY Search

Year of horse.

Exponentiation

STRASSEN MATRIX MULTI.



7 instead of 8.

Closest pair of points

DYNAMIC PROGRAMMING

distinct

$O(n^c m^d)$

$\Theta(n^3)$

$\Theta(n^2)$

$\Theta(n)$

- carry people
mantra

- MATRIX
CHAIN

- tug of war

- log cutting

- posters
placement.

- ZAP fence
(LOST)

- DS MASHUP.

- Typesetting.

full

$$Best_{pos i} = \max \begin{cases} Best_{pos i-1} \\ Best_{pos(buddy(i))} + V_i \end{cases}$$

Binary
variables.

WHOLE:

$O(n^c m^d)$

$\Theta(n^3)$

$\Theta(n^2)$

$\Theta(n)$

gerry

matrix chain

posters

seam carving

typesetting

monotonicity

zap

tug

shortest paths →

BELLMAN-FORD

Floyd-Warshall

$AShort_{i,j,k}$

$Short_{i,v} = \dots$

shortest path from

$S \rightsquigarrow v$ that uses

i hops.



GREEDY

exchange 5

contradiction

• scheduling
(earliest deadline first)

• CACHING

• BARISTA, HW from exam

• HUFFMAN coding

→ • DIJKSTRA

→ • MIN SPANNING TREES.

STABLE MATCHINGS.

FLOWS

methods

applications

FORD-FULKERSON

- Bipartite matching

EDMONDS-KARP

= EDGE/Node disjoint paths.

REDUCTIONS

→ NP-completeness.

① not knowing what to show

② showing the opposite

"Show that X is NP-complete."

~~$X \leq_p \text{3SAT}$~~

$\text{3SAT} \leq_p X$

③ $x \in \text{3SAT} \iff f(x) \in X$.

④ Argue that $X \in \text{NP} \dots$

NP-complete problems

3SAT, VC, Set cover,

IND SET, CLIQUE,

SUBSET SUM.



① NPQ

② Short Answer

③ GRAPH

④ ???
! ! !

① Greedy

② DP

③ DC.

