

Algorithm Design → CSCI 211 - 01

↑ this section

Professor Lu → Parmlg 412

112 - efficiency

121 - discrete

Today

1. About the Course
2. Do a little problem. (very easy)
3. Syllabus
4. Do a less little problem

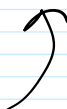
① Algorithm Design



series of step to solve a problem

problem-solving

practice



techniques

idea

Input: List of numbers.

$-2, 37, 481, 92, -5, 39, 3$ $\rightarrow L$

$|L| = n$ numbers

Question: Find the smallest difference between two numbers in L .

$x, y \in L$ s.t. $|x - y|$ is minimal.

2 37, 39

$L = \{ a, b, c, \dots \}$

Give an algorithm for min. difference?

ALG 1 Try all possible pairs.

1. Let the min. diff be $|a - b|$
2. For every $x \in L$, loop through all the other $y \in L$. And check whether this is the smallest.
3. Return the smallest diff.

$\Theta(n^2)$ ↗

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ALG 2

1. Sort the numbers, ascending $\rightarrow \boxed{O(n \log n)}$
2. Check every adjacent pair of numbers. $\rightarrow O(n)$
3. Return the min. diff.

"the smallest diff. must be an adjacent pair"

suppose $|a-b|$ is smallest, but $\frac{a, c, b}{\uparrow}$

$|a-c| \leq |a-b|$ ✓

$\boxed{\Theta(n \log n)}$ ← merge sort.

③ Syllabus

website — canvas.wlu.edu

Grading

55%

30%

HW → 7? 8? → Fri → Fri

HW → Mon

Exams → 2

30%	Exams \rightarrow 2
15%	Final \rightarrow 1
2%	other)
<hr/> 100%	total

11.

Material)

- ① come to class
- ② Lecture notes
- ③ Textbooks \leftarrow no required textbook.

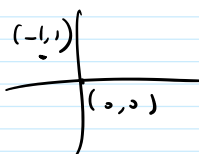
online \rightarrow Algorithms \rightarrow by Jeff Erickson. \nearrow ^{WINE}

Introduction to Algorithms \rightarrow CLRS

④ Homeworks \rightarrow ask me for answers.

④ Input: A list of points in 2D.

$(-1, 1), (0, 0), (1, 2), (4, 5), (-1, 2) \rightarrow L$



$$d = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$$

Question: Find the minimum distance between two points in L .

$x, y \in L$ s.t. $|x - y|$ is minimal.
distance

ALG 1: Try all pairs. $\rightarrow O(n^2)$

· make a graph somehow?

· sort by "quadrant"?!?

· average point?!?