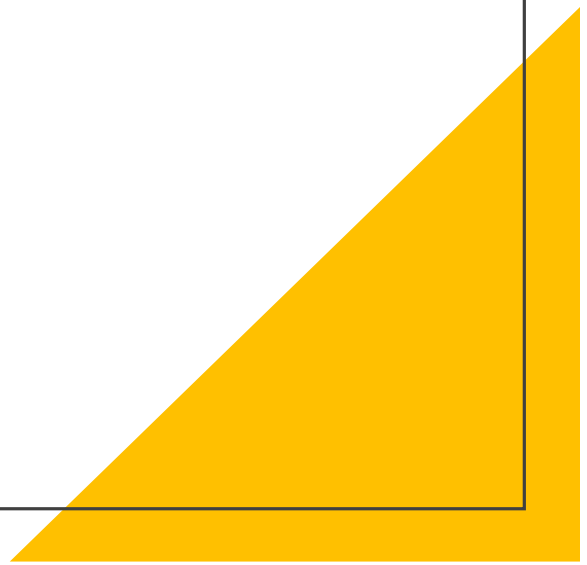
MOMENTUM LEARNING

USACO for College Application and Job Interview

Sugar Land, TX May 14, 2022

USACO for College Application and Job Interview

- USACO竞赛
- USACO和大学申请
- USACO和工作面试



USACO竞赛

USACO 奥林匹克信息学竞赛：算法设计与编程

Levels:

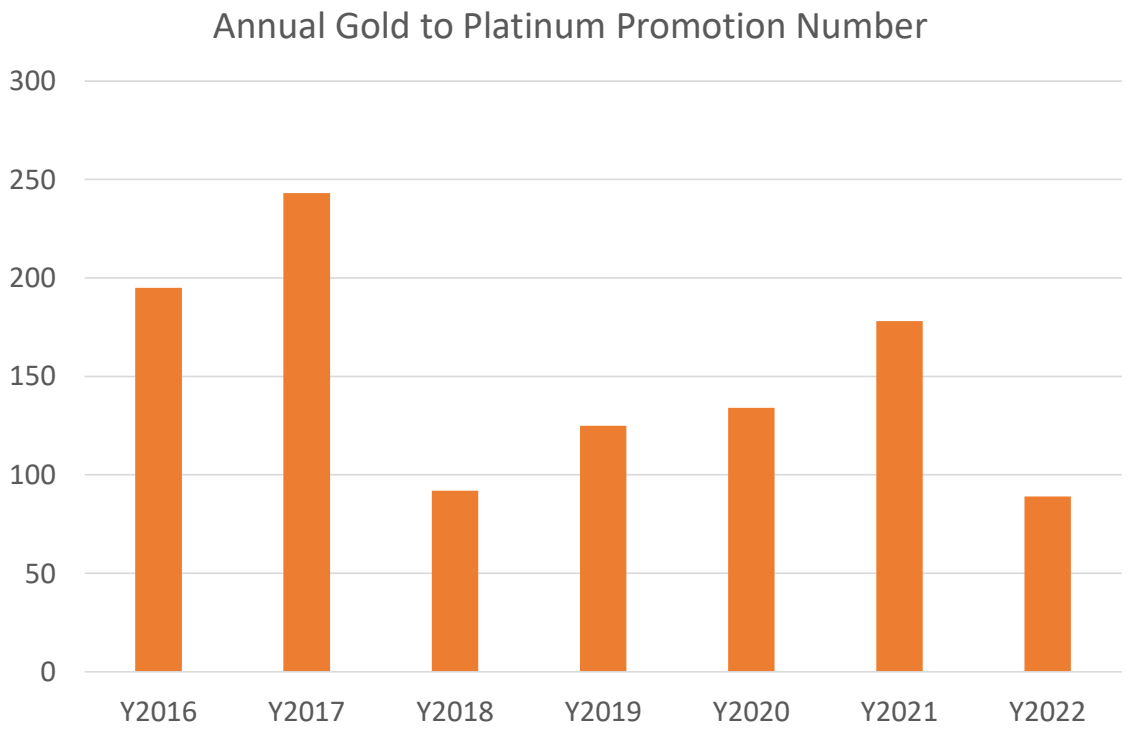
- Bronze
- Silver
- Gold
- Platinum

Four rounds per season:

- December
- January
- February
- March/April (US Open)

USACO竞赛

USACO铂金级
晋级人数



USACO竞赛

竞赛级别	覆盖内容
Bronze – Silver	基本编程工具; 竞赛编程技巧
Silver – Gold	常用数据结构、算法
Gold -- Platinum	图论; 复杂数据结构、算法
Platinum – Camp/Team USA	离散数学; 复杂图论

USACO和大学申请

MIT Computer Science

Introduction to Algorithms

Introduction to mathematical modeling of computational problems, as well as common algorithms, algorithmic paradigms, and data structures used to solve these problems. …

Mathematics for Computer Science

Elementary discrete mathematics for science and engineering, with a focus on mathematical tools and proof techniques useful in computer science. …

Design and Analysis of Algorithms

Techniques for the design and analysis of efficient algorithms, emphasizing methods useful in practice. Topics include sorting; search trees, heaps, and hashing; divide-and-conquer; dynamic programming; greedy algorithms; amortized analysis; graph algorithms; and shortest paths. …

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USACO和大学申请

Princeton Computer Science

Algorithms and Data Structures

This course surveys the most important algorithms and data structures in use on computers today. Particular emphasis is given to algorithms for sorting, searching, graphs, and strings.

Introduction to Graph Theory

The fundamental theorems and algorithms of graph theory. Topics include connectivity, matchings, graph coloring, planarity, the four-color theorem, extremal problems, network flows, and related algorithms.

Algorithms for Computational Biology

This course introduces algorithms for analyzing DNA, RNA, and protein, the three fundamental molecules in the cell. Students will learn algorithms on strings, trees, and graphs and their applications…

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USACO和大学申请

MOMENTUM LEARNING

CMU Machine Learning

Core courses

- Introduction to Machine Learning
- Intermediate Deep Learning
- Probabilistic Graphical Models
- Machine Learning in Practice
- Convex Optimization
- Probability & Mathematical Statistics

Elective courses

- Machine Learning with Large Datasets
- Deep Reinforcement Learning
- Advanced Machine Learning: Theory and Methods
- Algorithms for NLP
- Machine Learning for Text Mining
- Neural Networks for NLP
- Multimodal Machine Learning
- Algorithms
- ……

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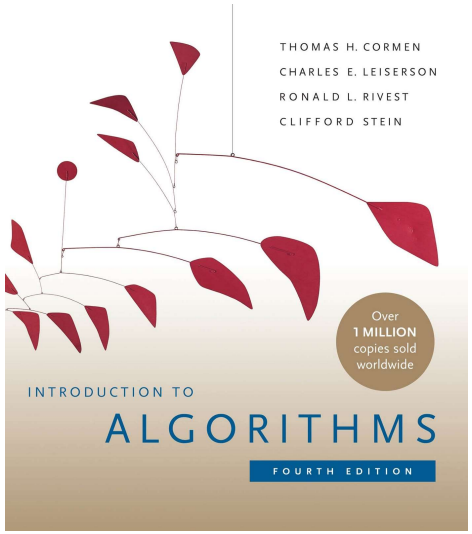
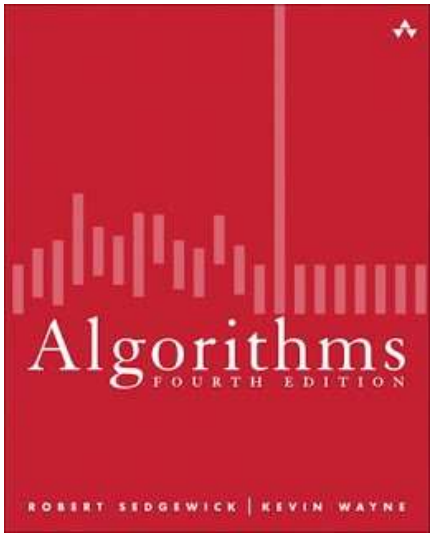
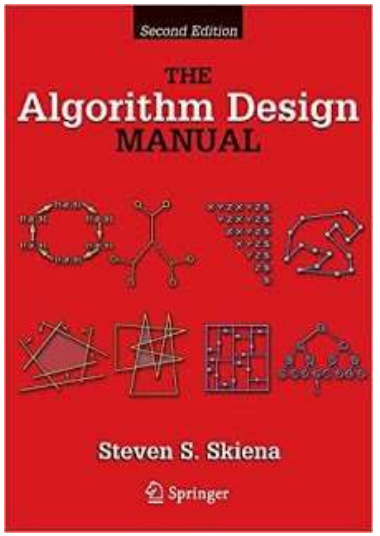
USACO和大学申请

Textbooks for Algorithm







USACO和工作面试

For a typical interview process:

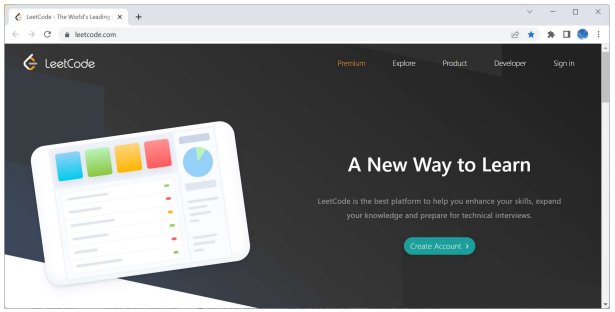
After online assessment and phone screening

- four to six onsite interviews
- about 45 min to 60 min for each interview
- three or four interviews include coding questions

USACO和工作面试

Top companies

Amazon	Google
Microsoft	Facebook
Apple	Bloomberg
Adobe	Uber
Oracle	ByteDance
Goldman Sachs	eBay
LinkedIn	VMware
Yahoo	Salesforce
Tiktok	Snapchat
Walmart Global Tech	Twitter
……	



USACO和工作面试

Topics

Array	String
Hash Table	Dynamic Programming
Math	Sorting
Depth-First Search	Greedy
Database	Breadth-First Search
Tree	Binary Search
Matrix	Binary Tree
Two Pointers	Bit Manipulation
Stack	Design
Priority Queue	Graph
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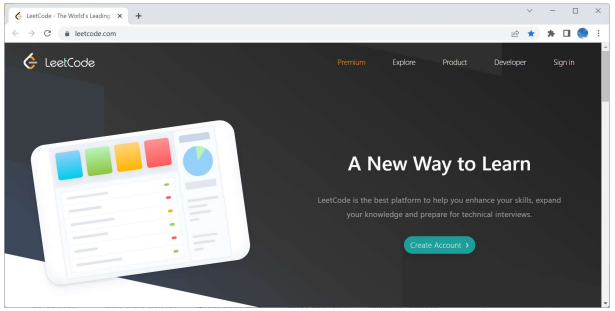
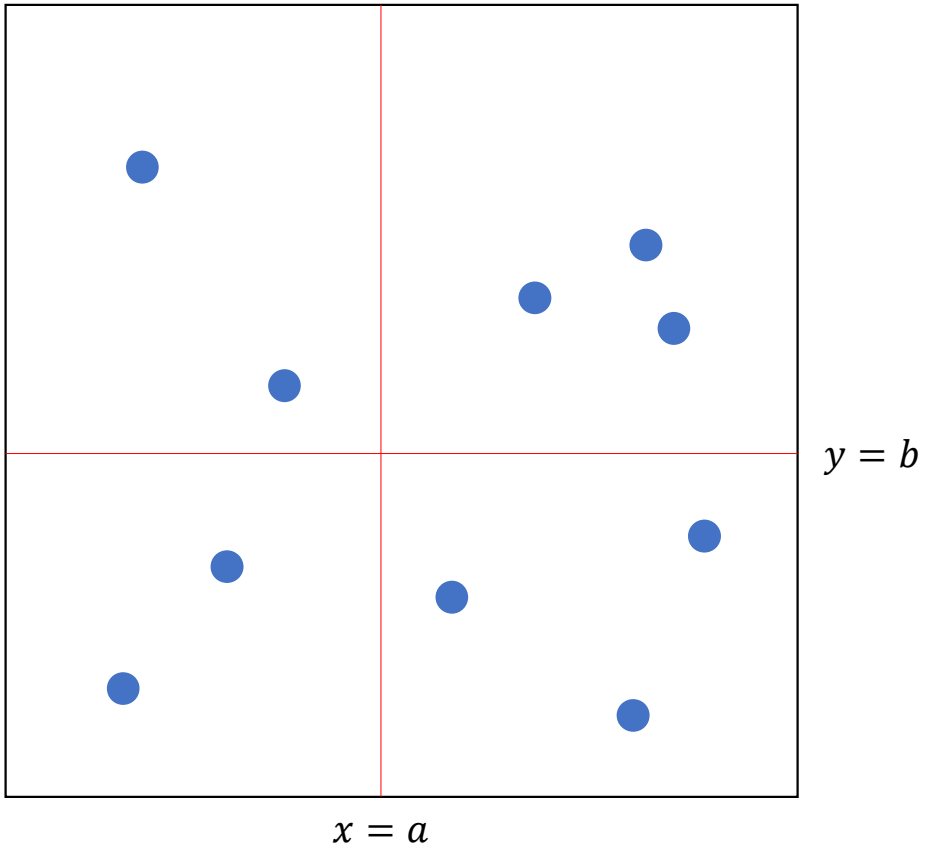


USACO和工作面试

Example 1: Load Balancing

Given N cows, partition them in four regions so that the counts in four regions are as close as possible.



USACO和工作面试

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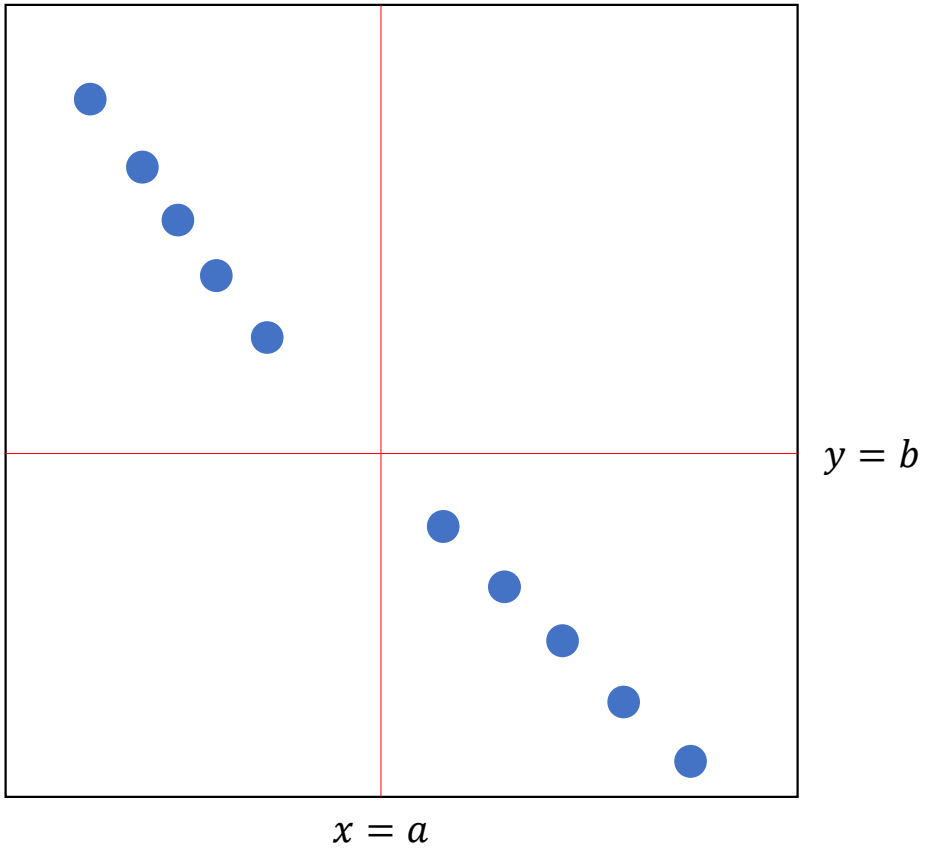


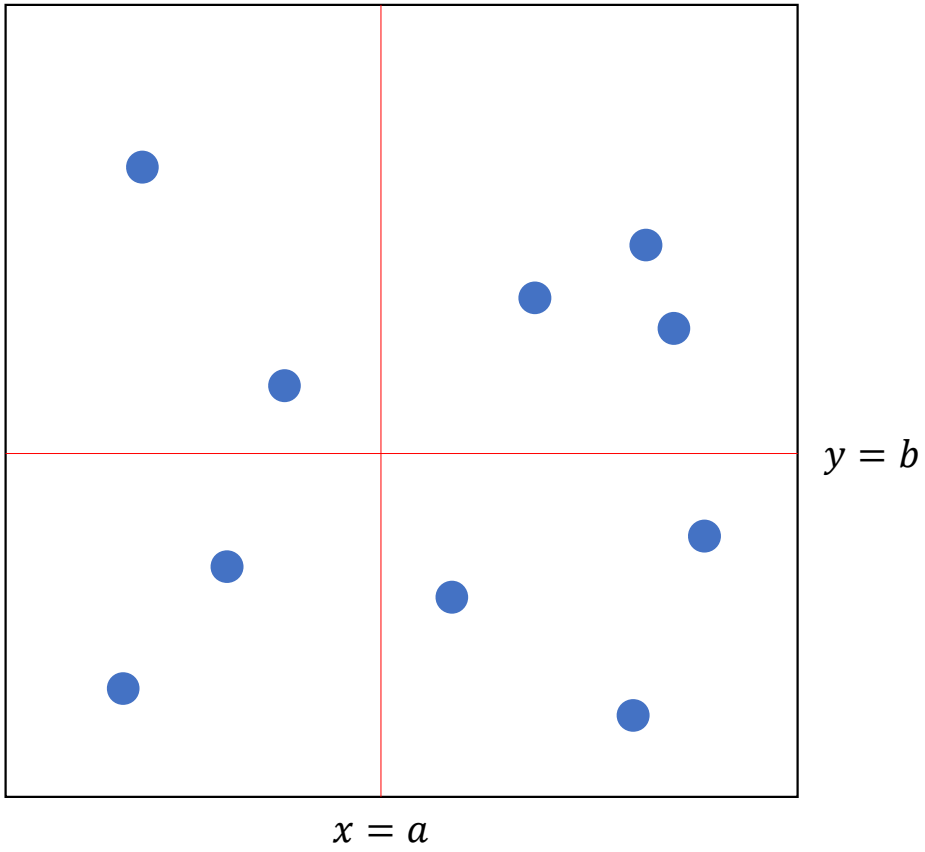
USACO和工作面试

Example 1: Load Balancing

$N \leq 100$ (bronze)
examine intervals

$N \leq 3000$ (silver)
two pointers / prefix sum

$N \leq 100000$ (gold)
binary search and BIT

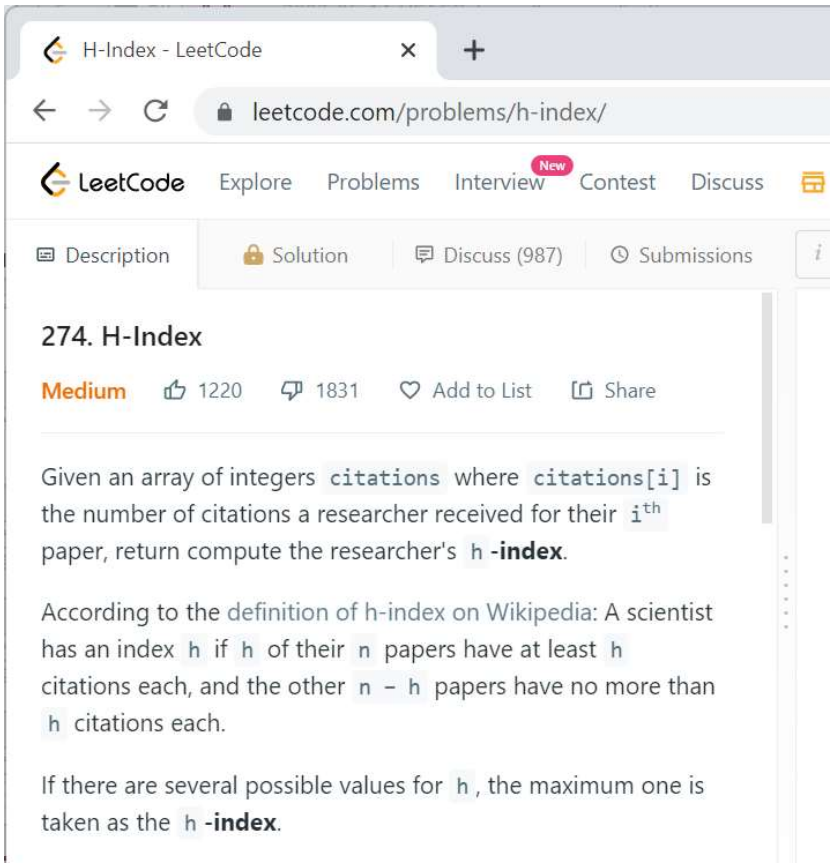


USACO和工作面试

Example 2: H-index

$N \leq 5000$

(leetcode medium)



USACO和工作面试

Example 2: H-index

$N \leq 10000$

(USACO 2021 bronze)

… Having worked for some time on her academic research, Bessie has now published N papers ($1 \leq N \leq 10^5$), and her i-th paper has accumulated c_i citations ($0 \leq c_i \leq 10^5$) from other papers in the research literature.

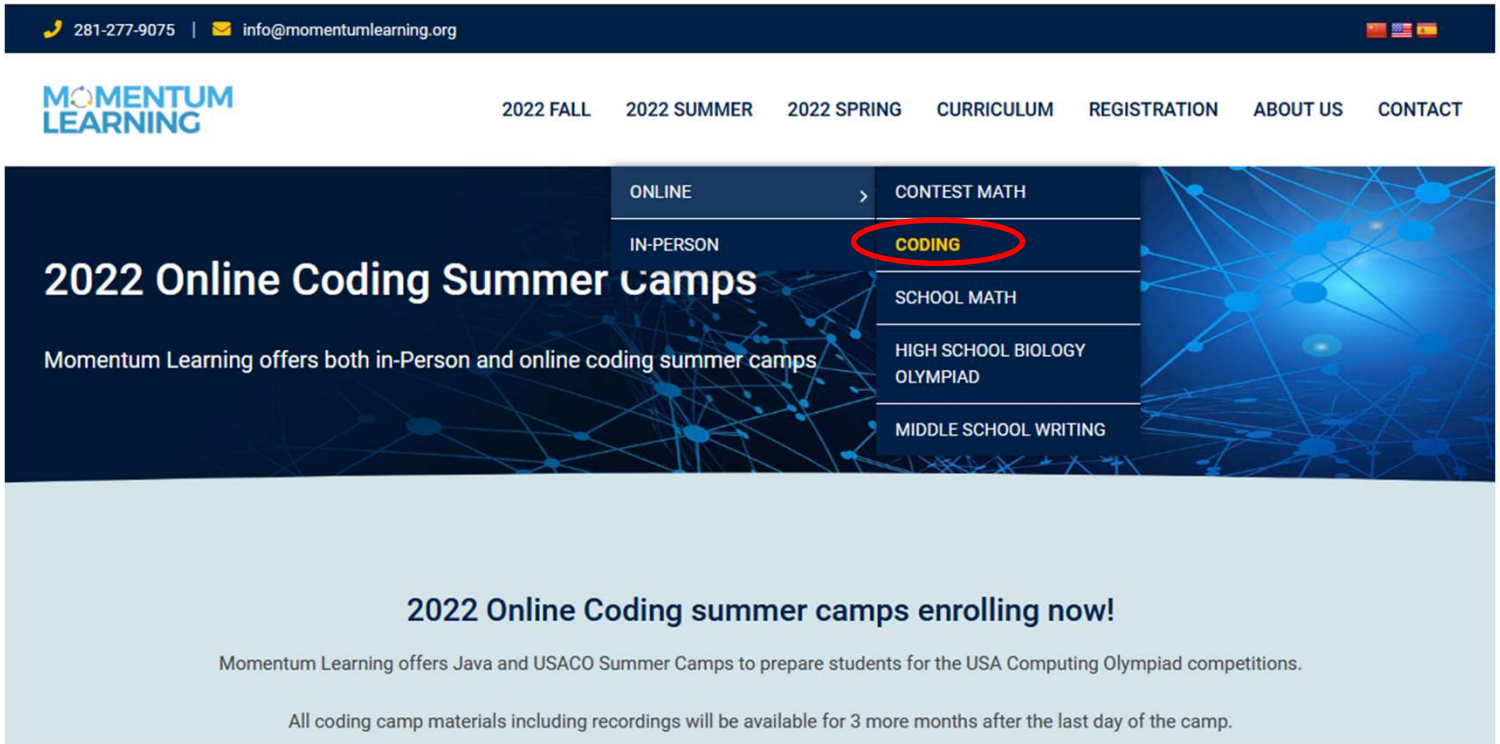
Bessie has heard that an academic's success can be measured by their h-index. The h-index is the largest number h such that the researcher has at least h papers each with at least h citations. …

To up her h-index, Bessie is planning to write a survey article citing several of her past papers. Due to page limits, she can include at most L citations in this survey ($0 \leq L \leq 10^5$), and of course she can cite each of her papers at most once.

Help Bessie determine the maximum h-index she may achieve after writing this survey.

Momentum USACO 2022 Summer Camp

https://www.momentumlearning.org/online-coding-summer-camps



Momentum USACO 2022 Summer Camp

https://www.momentumlearning.org/online-coding-summer-camps

Time: 10AM - 1PM & 2 - 5PM Central Time (6 hrs/day)

Java	Bronze Java/C++	Silver Java/C++
Session 1 June 13 - 17 (M-F)*	Bronze 1 Session 1 June 20 - 24 (M-F)	Silver 1 July 25 - 29 (M-F)
Session 2 July 5 - 9 (Tu - Sat)	Bronze 1 Session 2 July 11 - 15 (M-F)*	Silver 2 August 1 - 5 (M-F)
Both Java sessions cover the same material	Bronze 2 Session 1 June 27 - July 1 (M-F)	
	Bronze 2 Session 2 July 18 - 2 (M-F)*	* Hybrid Class (Students can attend either in-person or online)

Camp selection recommendation

- **No programming experience:** Introduction to Java. Students not continue with Bronze 1 in the summer (for most cases), they should continue with Java 2 in the fall
- **Some programming experience or other programming experience (Python, C++):** For students who had prior programming experience, they may be able to advance to Bronze A or Bronze 1 if they pass the Bronze A/1 self-assessment tests
- **Proficient with Java but no/limited USACO Bronze experience:** Bronze 1 (one session or both), then Bronze 2 (only if students complete both Bronze 1 sessions)
- **USACO Bronze test score 400 – 700:** Bronze 2 (one session or both), then Silver 1 (only if students complete both Bronze 2 sessions)
- **USACO Silver Qualifier:** Silver 1, then Silver 2
- **USACO Silver test score 400 – 700:** Silver 2

Discount

- $50 additional discount for each additional USACO class

Contact Us

Call us at 281-277-9075

Office Hours
Monday/Wednesday/Thursday: 4PM – 7PM
Saturday: 11AM – 2PM

Or **email us** at
info@momentumlearning.org

For those who use Wechat, you can connect with Mr. Cai if you have questions: