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Welcome to this session:

Coding Interview Workshop - Mathematics for Programmers

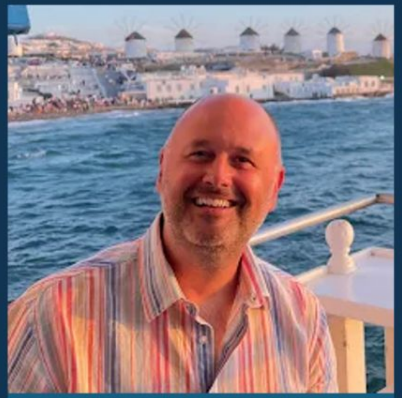
The session will start shortly...

Questions? Drop them in the chat.
We'll have dedicated moderators answering questions.

Safeguarding & Welfare

We are committed to all our students and staff feeling safe and happy; we want to make sure there is always someone you can turn to if you are worried about anything.

If you are feeling upset or unsafe, are worried about a friend, student or family member, or you feel like something isn't right, speak to our safeguarding team:



Ian Wyles
Designated Safeguarding Lead

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or email the Designated Safeguarding Lead:
Ian Wyles
safeguarding@hyperiondev.com

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- The use of disrespectful language is prohibited in the questions, this is a supportive, learning environment for all - please engage accordingly. **(Fundamental British Values: Mutual Respect and Tolerance)**
- No question is daft or silly - **ask them!**
- There are **Q&A sessions** midway and at the end of the session, should you wish to ask any follow-up questions. Moderators are going to be answering questions as the session progresses as well.
- If you have any questions outside of this lecture, or that are not answered during this lecture, please do submit these for upcoming Academic Sessions. You can submit these questions here: **Questions**

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- For all **non-academic questions**, please submit a query: ***www.hyperiondev.com/support***
- **Report a safeguarding incident: *www.hyperiondev.com/safeguardreporting***
- We would love your feedback on lectures: **Feedback on Lectures**
- If you are hearing impaired, please kindly use your computer's function through Google chrome to enable captions.

Learning Outcomes

- **Apply** modular arithmetic, prime number algorithms (Sieve of Eratosthenes), and GCD/LCM calculations.
- **Solve problems** involving combinations, permutations, and probability in a coding interview setting.
- **Understand number theory concepts** such as bitwise operations and their applications in efficient computation.

You are calculating (a × b) % m for very large a and b. What should you do?

A. Multiply first, then use %
B. Use (a % m) × (b % m) % m
C. Use a XOR b
D. Use factorials

What does the expression a & (a - 1) check for?

A. If a is even
B. If a is odd
C. If a is a power of 2
D. If a is a palindrome

Lecture Overview

- Modular Arithmetic
- GCD and LCM
- Sieve of Eratosthenes
- Combinations and Permutations

Practice the Math

Let's practice using our Mathematics skills by solving some classic problems.

Then we'll do the following problems together:

- Rotate Image
- Pow(x,n)
- Climbing Stairs

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When using Sieve of Eratosthenes up to $n = 10^6$, the number of primes returned is approximately:

A. 10^6

B. 10^5

C. 10^3

D. 10

What's the best time complexity for calculating all GCDs between n pairs of numbers?

A. $O(n^2)$
B. $O(n \log n)$
C. $O(n!)$
D. $O(n)$

Homework

Practise the skills we've developed by completing the rest of the LeetCode questions:

- Practise speaking through your solutions and explaining how you approached each problem.
- In the next lecture we'll be covering the topic: "Searching Algorithms"
- You can have a look at the following LeetCode questions to prepare:
  - Example 1
  - Example 2
  - Example 3

Summary

- ★ Math in programming isn't just about calculation—it's about control over how we manipulate data efficiently.
- ★ We learned how to apply modular arithmetic, sieve, combinations, and bitwise logic to technical interview problems.
- ★ Next time you're faced with a coding challenge, ask yourself: "What math structure or trick could simplify this?"

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Q & A SECTION

Please use this time to ask any questions relating to the topic, should you have any.

Thank you for attending

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