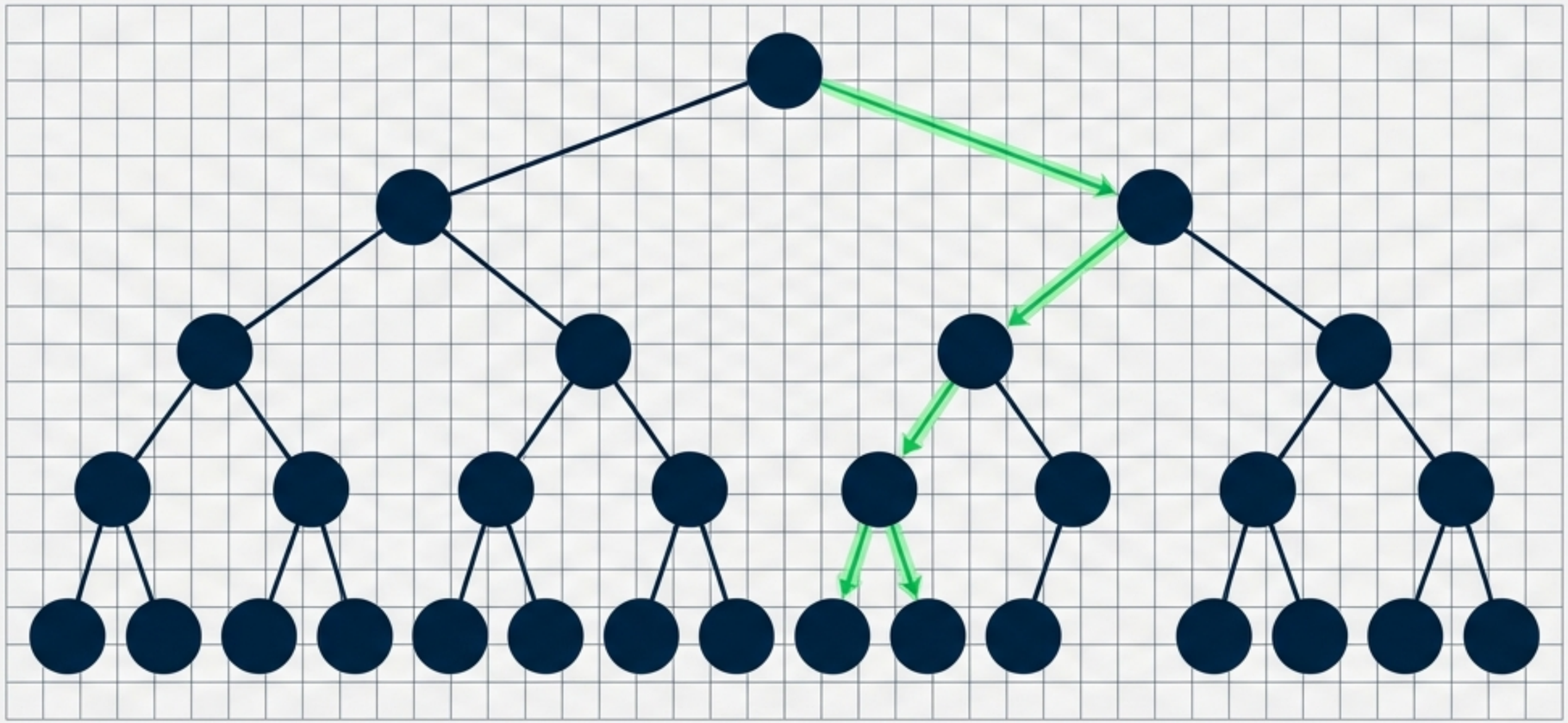
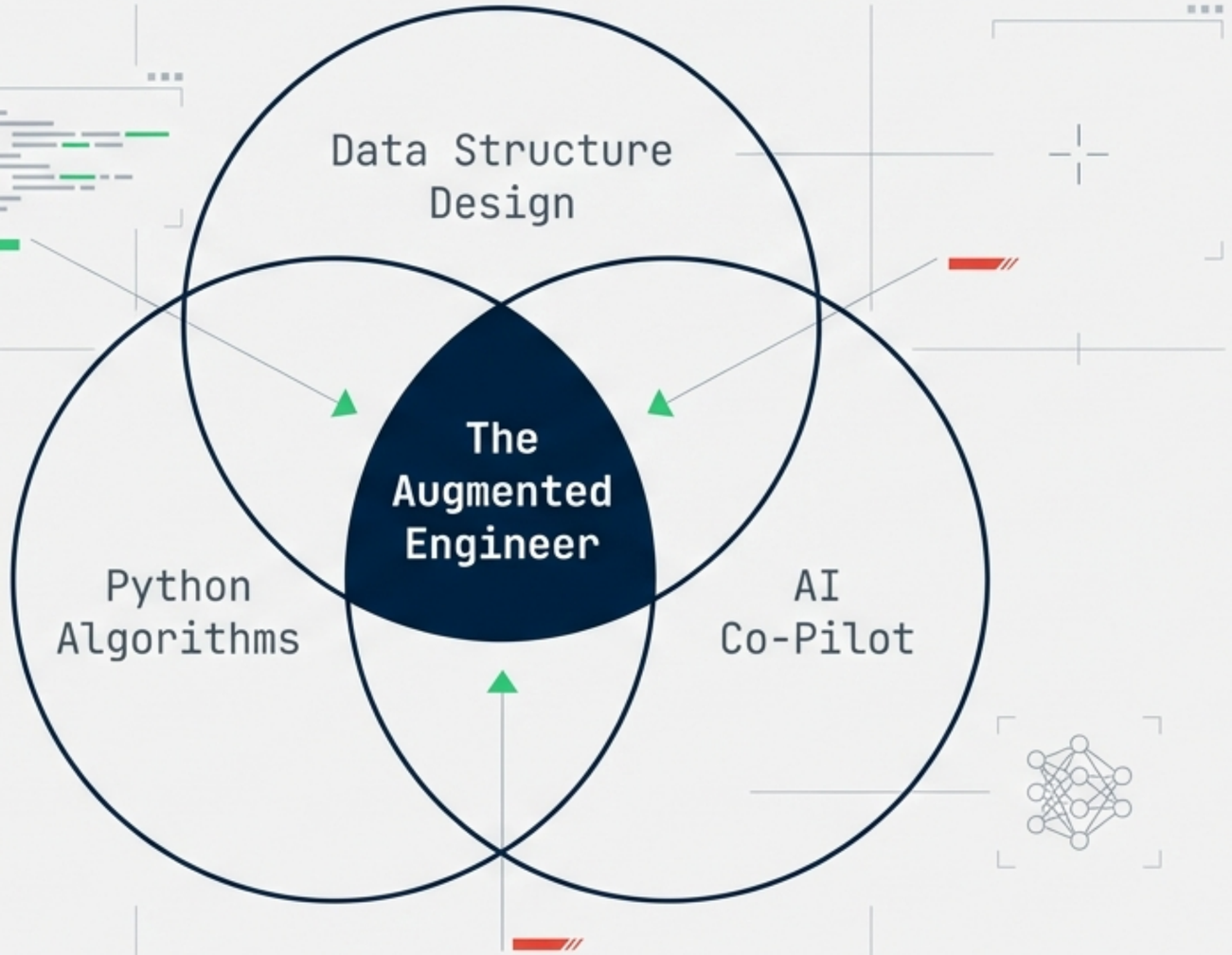
Data Structures with AI Integration

Mastering Algorithms in the Age of Artificial Intelligence



Week 1: Introduction & Complexity Analysis

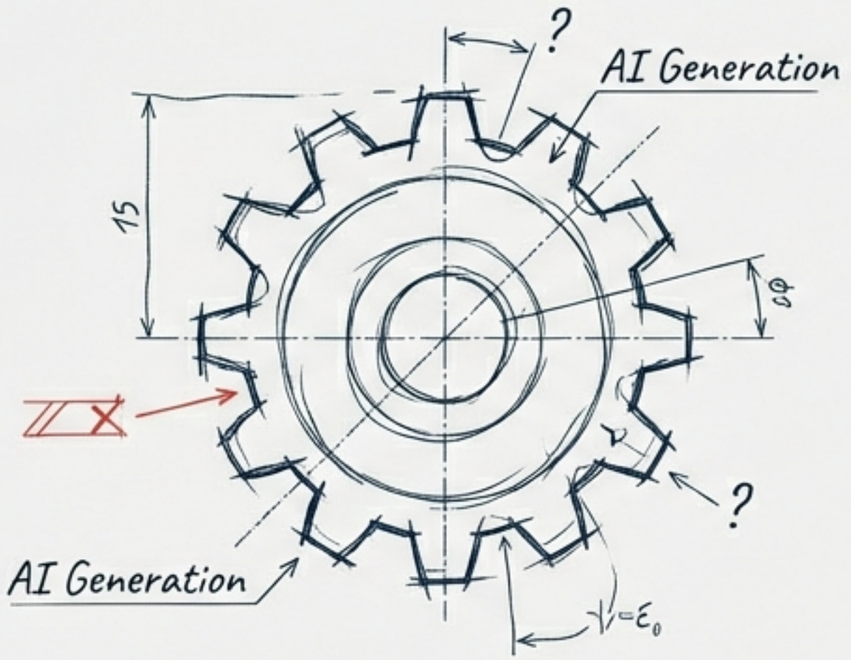
Developing the Augmented Engineer

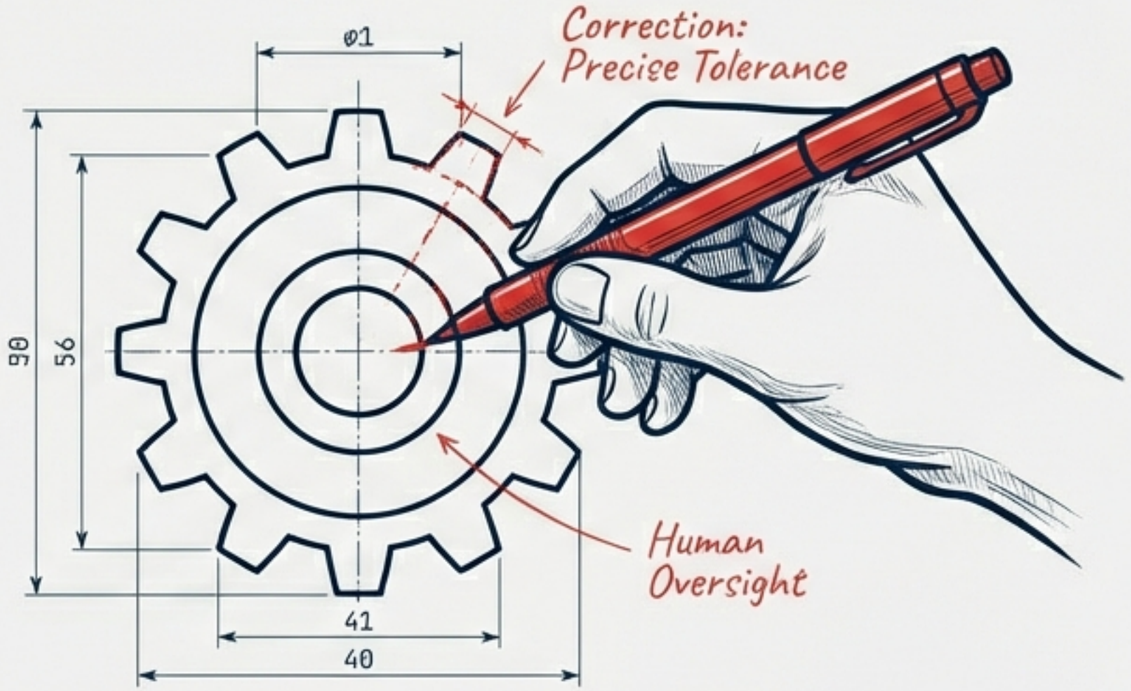


The Mission

- Goal: Design, analyze, and implement efficient software.
- The Paradigm Shift: AI is a tool, not a crutch.
- Outcome: Mastery of hybrid engineering.

The Philosophy: Managing Your Fallible Intern





The Mindset

Treat AI as a fast intern. It lacks context and accountability.

The Reality

AI hallucinations are frequent. It will confidently fail edge cases.

The Rule

You are responsible for every semicolon. Manage the AI; do not be replaced by it.

Rules of Engagement: Permitted Use

Green Light Activities

- **Scaffolding**: Generating boilerplate code (e.g., Class Node).
- **Exploration**: Concept analogies (‘Explain Heapsort like I’m 5’).
- **Debugging**: Locating syntax errors or logical bottlenecks.
- **Ideation**: Brainstorming industrial applications.

The Red Lines: Prohibited Use

Red Light Activities

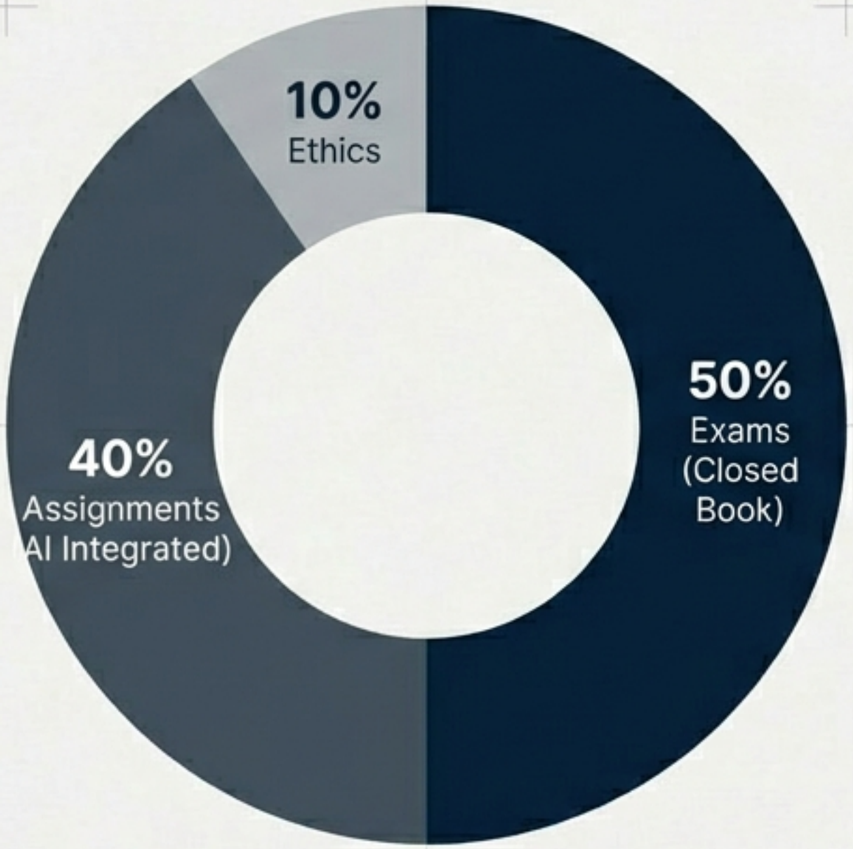
- **Logic Outsourcing:** Asking AI to solve the problem before drafting pseudocode.
- **Blind Copy-Pasting:** Submitting code you have not read or understood.
- **The Hallucination Defense:** ‘The AI told me it was right’ = Grade 0.

Documentation & Transparency

Proof of Ownership

- **Disclosure Statement** required for every assignment (Direct, Assisted, or Collaborative).
- **The Prompt Log:** A mandatory PDF export of your conversation history.
- **Transparency Standard:** If you can’t document it, you didn’t do it.

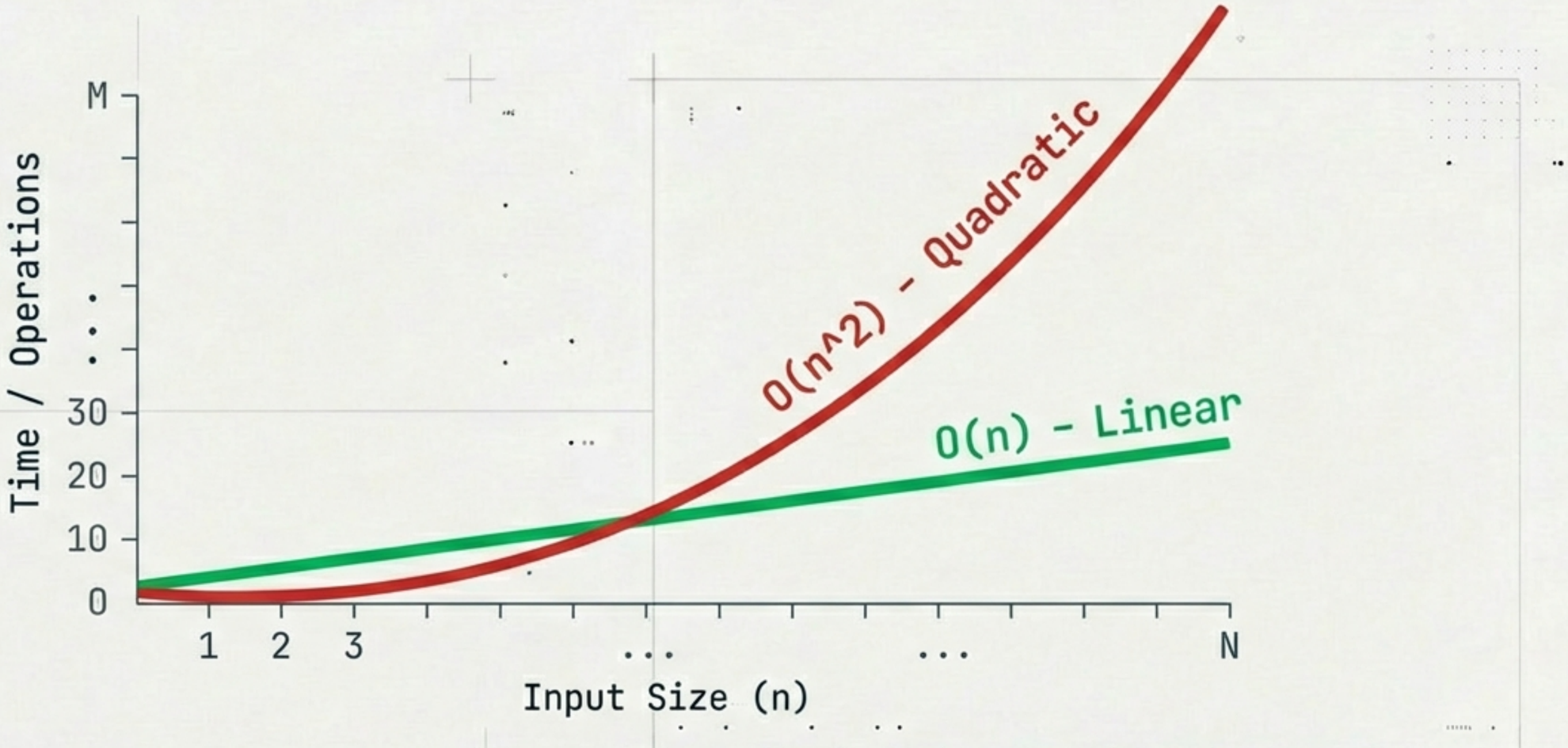
Assessment & The ‘EYC’ Rule



The ‘Explain Your Code’ Rule

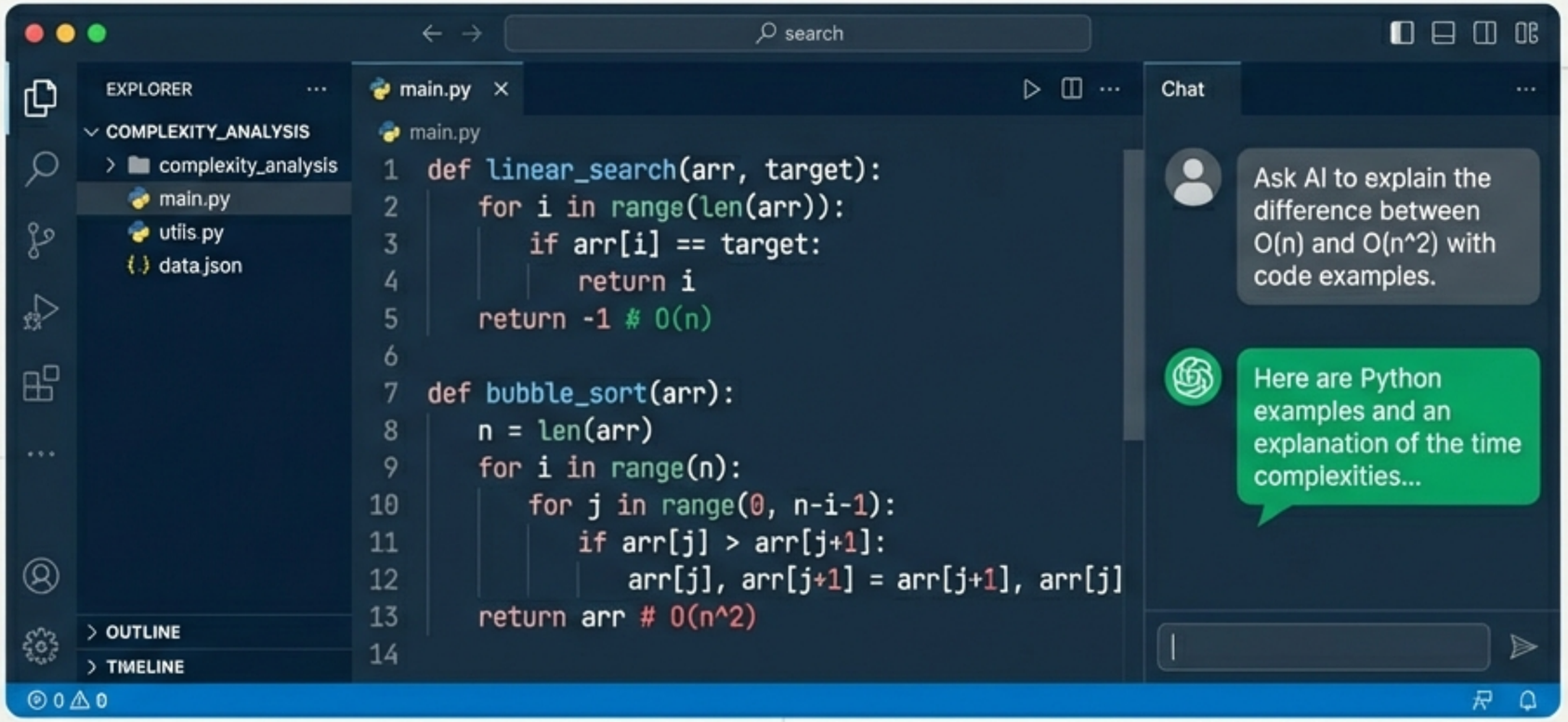
Random 5-minute viva sessions. If you cannot explain the logic of your submission line-by-line, the grade is reset to 0.

Week 1 Topic: Complexity Analysis



Why It Matters: Bad data structures explode under load. We must identify efficiency before implementation.

Week 1 Focus: AI Integration



Task: Ask AI to explain the difference between O(n) and O(n^2) with code examples.

Verification:

- ✅ Check the math manually. Does the
- ❌ generated code actually match the complexity claimed?

Summary & Next Steps

- [ ] Setup IDE Extensions
- [ ] Review Syllabus
- [ ] Start Complexity Module

Remember: You are the Pilot; AI is the Co-Pilot.

JetBrains Mono

Next Week: Functions, Arrays, and Pointers